

Official Transcript of Proceedings **ACRST-3330**

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
527th

Docket Number: (not applicable)

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

SISP - REVIEW COMPLETE

Location: Rockville, Maryland

Date: Thursday, November 3, 2005

Work Order No.: NRC-694

Pages 1-271

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

TR 04

**ACRS OFFICE COPY
RETAIN FOR THE LIFE OF THE COMMITTEE**

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

November 3, 2005

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, taken on November 3, 2005, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

This transcript has not been reviewed, corrected and edited and it may contain inaccuracies.

C O N T E N T S

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

PAGE

Introduction, Chairperson Wallis 3

Final Review of the License Renewal Application
for the Point Beach Nuclear Plant, Units
1 and 2:

Dr. Mario Bonaca, Subcommittee Chair 4

Frank Gillespe 6

Jim Knorr 8

Veronica Rodriguez 31

Patricia Lougheed 38

Grid Reliability and the Impact on Plant Risk:

John D. Sieber 69

Ronaldo Jenkins 76

Paul Gill 92

Bill Raughley 107

Alex Marion 126

Economic Simplified Boiling Water Reactor:

Thomas S. Kress 141

Amy Cubbage 142

David Hinds 147

P R O C E E D I N G S

(8:31 p.m.)

CHAIRPERSON WALLIS: The meeting will now come to order.

This is the first day of the 527th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting the committee will consider the following: the final review of the license renewal application for the Point Beach Nuclear Plant, Units 1 and 2; the draft final generic letter 2005-xx, "Grid Reliability and the Impact on Plant Risk and the Operability of Off-site Power"; the economic simplified boiling water reactor design; a draft ACRS report to the Commission on the NRC safety research program; and the preparation of ACRS reports.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Dr. John T. Larkins is the designated federal official for the initial portion of the meeting.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's sessions. A transcript of portions of the meeting is being kept, and it is requested that the speakers use one of the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 microphones, identify themselves and speak with
2 sufficient clarity and volume so that they can be
3 readily heard.

4 I'll remind members that during lunchtime
5 today we are scheduled to interview two candidates for
6 potential membership on the ACRS. I guess it's better
7 to say two potential candidates for membership because
8 I don't know what potential membership is.

9 I'll begin with some items of current
10 interest. You'll note in the handout that
11 Commissioner Lyons made a couple of speeches at the
12 beginning of this handout items of interest.

13 On page 63, I'm happy to note that Jess
14 Delgado, who you all know, was honored by the Hispanic
15 Employee Program Advisory Committee. And you may find
16 it useful to refer at a future date to the new NRR
17 organization chart at the very back of this handout.

18 Without further ado, I'd like to move on
19 to the first item, final review of the license renewal
20 application for Point Beach, and I will invite my
21 colleague, Mario Bonaca to lead us through it.

22 DR. BONACA: Thank you.

23 Good morning. This morning we are
24 reviewing the final ACR for the license renewal
25 application for Point Beach Nuclear Power Plant, Units

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 and 2. We review this matter also during our
subcommittee meeting of May 31st, and also during the
523rd meeting of June 1-3, 2005.

At the time we issued an interim report,
and essentially the interim report pointed out that we
didn't see any issues to do with the open items, et
cetera, that would be a main issue at the time of our
review. We, however, express concern regarding the
current performance of Point Beach.

And the main concern was to do with two
issues. One was the ability of the licensee to
properly implement commitments at this time when they
were responding to a number of regulatory challenges,
you know, there in column 4 of the RFP.

The other concern, of course, was with the
corrective action program, which is the main engine
behind license renewal, which is the ability of
identifying deficiencies and implement corrective
actions.

We received answers from the staff
regarding the plants for inspections, and I expect to
hear about today. I think they start this year, and
they will address these issues.

With that I will turn to the staff right
now. I believe is Mr. Gillespe here? He will lead

1 us in this presentation.

2 MR. GUILLESPE: Yeah, Mario, I think we're
3 still wrestling with the same thing you had just
4 mentioned, but we are doing everything possible to
5 maintain kind of our dictum, if you would, that
6 current performance is separate from license renewal,
7 but the committee is also free to ask the questions,
8 and we'll try to answer them as we can relative to
9 current performance, and there's some from the region
10 here ready to do that.

11 Well, with that, I'll turn it right over
12 to Jim and he can go through this from the licensee.

13 Oh, okay. We haven't done the
14 introductions.

15 MS. RODRIGUEZ: Right. Veronica
16 Rodriguez, project manager for Point Beach.

17 MS. LOUGHEED: I'm Patricia Lougheed. I
18 am the lead inspector for license renewal from Region
19 3.

20 MS. LAND: Yeah, and I just moved over to
21 license renewal through the reorganization I guess you
22 have heard about in NRR, and I'm now the Branch Chief
23 for license renewal, the project management are.

24 DR. BONACA: Just let me specify before we
25 get into the presentation, our recommendations in the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 interim letter really were for the staff and not for
2 the licensee. We asked specifically for some
3 commitments to augment the inspections of the cap,
4 Corrective Action Program and of the commitments.

5 And now the response said that the staff
6 would be performing inspection in accordance with IC-
7 71003, which is a standard review, pre-liense renewal
8 review that you perform for any licensee. So
9 therefore, you'll have to explain a little bit to the
10 committee how this commitment is responsive to our
11 request for an amended inspection process.

12 MR. GUILLESPE: Okay. I think Pat's going
13 to be ready to talk about that. When you look at the
14 scheduling of the normal, every two-year PINR program,
15 the sequencing comes so that there will be one and
16 then there will be another one right before they enter
17 the renewal period. And so I think we'll be able to
18 discuss some of the scheduling aspects and what's
19 going to be happening in the normal program as opposed
20 to just what's specifically being done for renewal.

21 DR. BONACA: Okay. I just wanted to
22 specify what the concern of the committee was, and
23 we're trying to understand in which way the response
24 to intercede is responsive to our concerns.

25 CHAIRPERSON WALLIS: Jim.

1 MR. KNORR: Very good. Thank you.

2 Good morning, gentlemen. My name is Jim
3 Knorr. I am the project manager for the Point Beach
4 license renewal project, and we're pleased to be here
5 this morning, and answer any of your questions, but
6 what I want to do is just go through a very quick
7 presentation here giving a little bit of background
8 about Point Beach and its application and the SER.

9 I have with me my team this morning, and
10 these are the names of the guys who have worked very
11 hard over the last five years to put the application
12 together, answer any RAIs and respond to any questions
13 that you might have today if I can't answer them.

14 Point Beach is a two loop Westinghouse
15 PWR. We're owned by We Energies of Wisconsin Electric
16 Corporation on the big board. We are operated and all
17 of us work for Nuclear Management Company, LLC. We're
18 located in Two Creeks, Wisconsin, about 90 miles or so
19 northeast -- I should say north northeast -- of
20 Milwaukee on the west shore of Lake Michigan.

21 Our architect-engineer was Bechtel Corp.
22 Rated thermal power is 1,540 watts, megawatts thermal,
23 although the license renewal application assumed a
24 power up rate. Our rated output is at 538 at this
25 point, and we're looking at that up rate, but not for

1 a couple of years off.

2 We have four emergency diesel generators,
3 any one of which can provide the emergency power for
4 the station. We also have a combustion turbine on
5 site, which is --

6 DR. BONACA: Excuse me. "For the
7 station," you mean both units?

8 MR. KNORR: For both units, that's
9 correct. With one diesel we can respond to an
10 emergency, an accident, one, and bring the other one
11 to safe shutdown.

12 The combustion turbine is there as a
13 station blackout device. Also, it's a device that's
14 used for fire protection, as well. It's needed for
15 that.

16 Our heat sink is Lake Michigan. We have
17 a once through cooling system. Our containment is a
18 post tension, steel reinforced concrete containment
19 with a steel liner, and at present we are in 18-month
20 fuel cycles.

21 CHAIRPERSON WALLIS: Can I ask you about
22 this containment?

23 MR. KNORR: Yes, sir.

24 CHAIRPERSON WALLIS: I'm a bit puzzled.
25 I saw that you are allowing 50 percent thickness loss

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 of the containment plate, and you had had some borated
2 water corrosion.

3 I couldn't find out how much erosion had
4 occurred. Have you had a 50 percent thickness loss or
5 have you had a one percent thickness loss or what?

6 MR. KNORR: There are some examples where
7 we did have some loss. I don't have the details.
8 John, can you? Do you happen to know what the actual
9 losses were, or Mark?

10 MR. ORTMAYER: Mark Ortmyer, NMC.

11 The 50 percent of all loss was due to the
12 mechanical damage. As far as corrosion --

13 CHAIRPERSON WALLIS: It actually happened?

14 MR. ORTMAYER: Yes.

15 PARTICIPANT: I thought it was more like
16 40 percent that you actually had and you were okay up
17 to 50.

18 MR. ORTMAYER: It's less than 50, but it's
19 approaching 50, I guess.

20 PARTICIPANT: It's high, yes.

21 MR. ORTMAYER: Yeah, and it was mechanical
22 damage.

23 CHAIRPERSON WALLIS: How did you
24 mechanically damage a containment plate?

25 MR. ORTMAYER: We were drilling.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRPERSON WALLIS: You drilled holes in
2 it?

3 MR. ORTMAYER: We were drilling core holes
4 in the concrete, and --

5 CHAIRPERSON WALLIS: You drilled into the
6 plate.

7 MR. ORTMAYER: Correct.

8 MR. KNORR: We drilled into the plate
9 underneath the concrete mat.

10 CHAIRPERSON WALLIS: That's just a local,
11 very local.

12 MR. ORTMAYER: Very local. That's
13 correct.

14 MR. KNORR: One small spot, right.

15 CHAIRPERSON WALLIS: The borated water
16 corrosion, how extensive is that?

17 MR. ORTMAYER: Could you please repeat
18 that?

19 CHAIRPERSON WALLIS: The borated water
20 corrosion, how extensive is that?

21 MR. ORTMAYER: We've observed very little
22 actual material loss in these locations, these card
23 holes where we -- the purpose of drilling them was to
24 be able to monitor the plate thickness, and in these
25 different sites, the actual material losses, you know

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 -- I don't know -- it's mLs. It's not extensive.

2 MR. KNORR: Okay?

3 CHAIRPERSON WALLIS: Well, I don't want to
4 pursue this forever. I am just curious about it
5 because I was wondering if by drilling a few holes you
6 could really tell. If you had a place where you had
7 water collecting and corroding and --

8 MR. KNORR: What we wanted to find is
9 whether we were seeing water collecting there
10 underneath the base mat on the steel liner underneath
11 it.

12 We also were installing corisometers
13 (phonetic) to see whether or not we were having some
14 corrosion of the liner plate.

15 CHAIRPERSON WALLIS: Anyway, the staff is
16 satisfied with what the licensee has been doing about
17 this?

18 MS. RODRIGUEZ: If they're talking about
19 the open item, the applicant agreed to commit to
20 including valuation, repair and replacement
21 requirements into the in-service inspection program,
22 and this was found acceptable by the staff.

23 MR. KNORR: Okay?

24 DR. BONACA: Since we're asking questions
25 about containment, there has been a report here on

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 containment coatings.

2 MR. KNORR: That's correct.

3 DR. BONACA: Could you tell us about that?

4 MR. KNORR: We have had some containment
5 coatings that have been degraded, and in some cases we
6 have found them to be not qualified. We have been
7 keeping track of the square footage of that, and we
8 have been monitoring that and making sure that our
9 analysis covers the amount of coating that we have
10 discovered to be either degraded or nonconforming.

11 We are also -- there have been a number of
12 bulletins and generic letters on this issue as well,
13 and GSI-191 also covers the coatings issue. We have
14 already contracted and are designing a new sump
15 screening system for the containment sump, and we
16 believe we have the corrective action in place to take
17 care of this issue ultimately under GSI-191.

18 DR. BONACA: So is the containment
19 operable right now?

20 MR. KNORR: The containment is operable,
21 but the coatings are nonconforming at this point, and
22 so we do have to repair them or --

23 DR. BONACA: Now, you have an estimated of
24 11 square feet of surface on Unit 2 containment
25 affected by this finding.

1 MR. KNORR: That is correct, and we
2 actually began a shutdown, got through about 97
3 percent as we went in and removed the majority of that
4 coating so that we came within our analysis.

5 DR. BONACA: That's removed now?

6 MR. KNORR: That's correct, and we're back
7 at full power.

8 DR. BONACA: How did you find this issue?
9 Is it because now you're looking at commitments, et
10 cetera, to determine if you have problems out there
11 and you identify it an issue?

12 MR. KNORR: We're actually looking at our
13 analyses for this, and we discovered that there was a
14 potential for Unit 2 to have some coatings that were
15 just slightly above what we felt was coverable by the
16 analysis.

17 So it became prudent for us, I believe, to
18 declare SI inoperable and begin the shutdown and
19 actually go in and remove enough of the coating so
20 that we were still within the analysis.

21 CHAIRPERSON WALLIS: While you are on this
22 overview level, did you replace the RPV heads or --

23 THE WITNESS: MR. KNORR: Yes, both heads
24 have been replaced. Unit --

25 CHAIRPERSON WALLIS: In the document it

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 says "scheduled to be replaced." There's nothing
2 about whether they actually --

3 MR. KNORR: That is correct, and if you
4 can go through some slides here, you'll find that --

5 CHAIRPERSON WALLIS: You did do it.

6 MR. KNORR: -- we've actually done --
7 right. The new head for Unit 1 was installed a couple
8 of weeks ago, and we are in the process of starting
9 up. So both units now have new reactor heads.

10 CHAIRPERSON WALLIS: Thank you.

11 MR. KNORR: Performance summary. We, as
12 you can see, the capacity factors are very good here.
13 Some of our outages are not as short as we would like
14 them, but nonetheless, we're doing the work that's
15 necessary to make the plant run for a long period of
16 time without many issues, and you can see from the
17 capacity factors that we've been successful with that
18 over the last cycles.

19 Major improvements. Unit 1 had new steam
20 generators back in 1984. They are still in good
21 shape. We've just done some inspections on those and
22 have found nothing new that we have to deal with
23 there.

24 Unit 2 had its new steam generators done
25 in 1996-97 time frame.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 We had split pins replaced in both units
2 already. Unit 2 had some baffle bolt replacements in
3 1998 and discovered that we really didn't believe
4 there would be anything else we'd need to do for Unit
5 1 there.

6 We are continuing to monitor that, and our
7 program actually, reactor vessel internals program,
8 will continue to monitor that to make sure that Unit
9 1 and Unit 2 are in good shape as far as the baffle
10 bolts are concerned.

11 We had originally when our low pressure
12 turbines were installed -- they did not have an
13 integral hub. There were separate units, and we had
14 to concern ourselves with missiles.

15 That is not the case any longer. We
16 replaced all four low pressure turbine sets in both
17 units in 1998. So we don't have to deal with that
18 issue any longer.

19 We did some major upgrades to portions of
20 the service water system back in 1998 through 2000.
21 We had noticed some aging occurring in our containment
22 fan cooler heat exchangers and replaced those in 2000-
23 2002.

24 The reactor vessel head replacements are
25 complete, as I've said earlier. We're scheduled also

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 to replace auxiliary feedwater pumps in 2006 and 2007.
2 I'm sure that all of you know that we've had some
3 questions about our auxiliary feedwater system. We
4 have done the calculations and say the current ones
5 are adequate, but our margin is very low, and we need
6 to recover more of that margin. So we're installing
7 new aux. feedwater pumps.

8 In fact, they will be large enough to be
9 able to provide the aux. feedwater if we go through to
10 a power up rate as well.

11 CHAIRPERSON WALLIS: Now, you also revised
12 the procedure for the discharge valves?

13 MR. KNORR: Yes, we have.

14 CHAIRPERSON WALLIS: But it doesn't say in
15 the document that this solved the problem. It simply
16 says that the procedure was revised. Did it actually
17 solve the problem?

18 MR. KNORR: The procedure I think you're
19 talking about is a recent LER that we had.

20 CHAIRPERSON WALLIS: AOP-10.

21 MR. KNORR: AOP-10, right. AOP-10 is a
22 procedure that covers operation of a plant when there
23 is reason to be outside the control room, fire or non-
24 fire, whatever the case may be.

25 And from the remote station we discovered

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 that the research valves did not open automatically on
2 the start of the aux. feedwater pump from that remote
3 location.

4 So what we have done is we have modified
5 the procedure to make sure that that is done when
6 those pumps are started. So it has solved the problem
7 as far as making sure that we have recirc.

8 CHAIRPERSON WALLIS: It's a sequencing
9 problem, is it?

10 MR. KNORR: Frankly, from the remote
11 shutdown panel, it was not an automatic opening, and
12 so we have to do that manually now.

13 DR. SHACK: You're also susceptible to
14 PTS, and as I read the thing, it makes it sound as
15 though you're going to go to a low leakage core. You
16 haven't been operating with a low leakage core?

17 MR. KNORR: We have a low leakage core,
18 but even with the low leakage core that we have right
19 now, it would only get it us somewhere I think in the
20 neighborhood of 2017, something like that.

21 And, frankly, there are a number of
22 options that we have. One is making sure that we have
23 more shielding for the wells in our vessel, and this
24 is for Unit 2 specifically.

25 The other options are an alternate

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 analysis that would be approved by the NRC, and also
2 we're quite hopeful that the NRC is looking at a
3 revised rule to change the acceptance criteria for
4 PTS, but nonetheless, if either the analysis or the
5 PTS rule is not changed, there are still some other
6 options that we have for even more shielding for the
7 welds that we have, and we could easily make it to 60
8 years with those changes.

9 We have a couple of years to make those
10 decisions yet.

11 Okay. Our original license expiration, we
12 have a misprint here obviously. October 5th, 2010 --

13 CHAIRPERSON WALLIS: I'm sorry. I don't
14 have any of your slides. So I can't read ahead, but
15 you talked about replacing feedwater pumps. Do you
16 have problems with the RHR pumps as well?

17 MR. KNORR: I don't have any --

18 CHAIRPERSON WALLIS: Lower than specified
19 minimum flow rate from the RHR pumps. And it said in
20 the document that this was being resolved by
21 calculation. It would seem to me that it should be
22 resolved by test.

23 MR. KNORR: I'm afraid that that -- does
24 anyone from the team have any knowledge of that
25 particular document that you're talking about?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 PARTICIPANT: Which document are you
2 talking about?

3 CHAIRPERSON WALLIS: Page 8 and 9 of the
4 SER I guess it is. It says, "RHR pumps, flows lower
5 than minimum specified values." And I wondered how
6 this could be resolved by doing calculation. It
7 seemed to be the desired solution.

8 MR. KNORR: I'm afraid I --

9 CHAIRPERSON WALLIS: You don't know about
10 that one?

11 MR. KNORR: I'm not familiar.

12 PARTICIPANT: Jim, we should look at the
13 wording in the SER to understand what it is.

14 MS. RODRIGUEZ: If you can point out the
15 section of the SER.

16 CHAIRPERSON WALLIS: I think it's page 8
17 and 9 or it's a letter. It's a letter. It's on the
18 letter inspection report. Sorry. That's where it is.
19 September 23rd, 2005. Isn't that where it is?

20 Anyway, we can come back to that.

21 MS. RODRIGUEZ: We'll need to look it up.

22 CHAIRPERSON WALLIS: Okay.

23 MR. KNORR: Right. I'd have to look at
24 that.

25 CHAIRPERSON WALLIS: Is this yours?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. SIEBER: That's yours now.

2 CHAIRPERSON WALLIS: It's not mine now.

3 MR. KNORR: I'm sorry, Mr. Wallis. I have
4 not --

5 CHAIRPERSON WALLIS: Okay. Move on.

6 MR. KNORR: Okay. The application was
7 submitted in February of 2004. We did go through the
8 same process for the application as the more recent
9 plants, standard LRA format and expanded content. We
10 were one of the first plants to give all of the
11 details for all of our programs in the application.

12 We used a lot of past precedence in our
13 application. The NRC used a new review process
14 consistent with GALL audits, actually showing up on
15 site, which we absolutely applaud. That was a great
16 process as far as we're concerned.

17 I know that you're all interested in our
18 corrective action program. We have a common process
19 across our NMC fleet. We have a piece of software
20 that is actually fleet-wide. It's used throughout the
21 nation, but for us it's called Team Track. It is in
22 the process of being replaced with a new system, which
23 is even more enhanced than the system that we have
24 right now.

25 We do have the corrective action program

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 in that software, and just to give you an idea, I know
2 the last time that we met back in June, one of the
3 questions was: what's our backlog? And what's our
4 rate of generation?

5 And the backlog right now was about 3,000
6 of them about a year and a half ago, and we're now
7 less than 1,500 total items that are in our backlog,
8 but nonetheless, we still are generating in the
9 neighborhood of 750 corrective actions and actually
10 corrective action items every month. So we're staying
11 ahead of that curve, and we're continuing to see a
12 slight decline in the backlog even though we're in an
13 outage at this point.

14 CHAIRPERSON WALLIS: Is this a usual
15 number, 750 a month? It seems pretty high. Is that
16 usual? Is it sort of the average for plants?

17 MR. KNORR: We have an extremely low
18 threshold for corrective action programs. For
19 instance, one of my team cut his finger, for instance,
20 on some paper, that that is a corrective action that
21 has to be written.

22 CHAIRPERSON WALLIS: On paper?

23 MR. KNORR: A paper cut.

24 CHAIRPERSON WALLIS: Happens all the time.

25 MR. KNORR: Happens all the time. Goes

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 into our corrective action program.

2 CHAIRPERSON WALLIS: Don't touch paper
3 with finger?

4 MR. KNORR: I'd rather not comment, sir.

5 (Laughter.)

6 DR. BONACA: One thing, you know, you have
7 a bullet there that says "corrective actions preclude
8 repetition." Now, you had repetitive problems with
9 your auxiliary feedwater system, and you know, to what
10 extent that is tied to inadequate root cause
11 evaluation?

12 MR. KNORR: We have done some root causes
13 on just exactly that and have come to that same
14 conclusion. We believe that our corrective actions
15 could have been more robust, and we, you know,
16 continue to try and make the root cause evaluation
17 process more robust so that our corrective actions are
18 actually successful and actually are sustained at
19 level of operation.

20 I believe that --

21 DR. BONACA: -- you know, by just lowering
22 the threshold and including paper cuts, it just
23 doesn't address the repetitive nature of some of these
24 issues, and again, so hopefully you're looking at your
25 root cause analysis and looking at how --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. KNORR: We are looking at root cause
2 analysis. We are looking at how that process works.
3 We're looking at the corrective actions, and we're
4 looking at the corrective actions carefully for
5 sustainability and the capability to actually correct
6 something so that it doesn't happen again.

7 I totally agree. The reason that we have
8 lowered the threshold to where it is is if you don't
9 identify the problems, you aren't going to be able to
10 deal with them.

11 DR. BONACA: I'm not arguing about that.

12 MR. KNORR: Right. So really for us,
13 you're doing the slide very well for me here. Really
14 we want to use this corrective action program to make
15 sure that we have some reasonable assurance that we've
16 actually determined what the cause is; that we have
17 those corrective actions that are going to stop any
18 repetition that could occur; and we want to make sure
19 that it is taken in a timely manner and an effective
20 manner and sustainable manner.

21 The NRC has recently come in or the PI&R
22 inspection last September. Their inspection report is
23 not yet released, and I think that Patricia will maybe
24 talking to some of that later on in her presentation.

25 CHAIRPERSON WALLIS: These corrective

1 actions, are the flooded manholes part of this
2 correction?

3 MR. KNORR: Absolutely they are.

4 CHAIRPERSON WALLIS: I was a bit concerned
5 that there seemed to be plans, and it said the
6 solution is being pursued.

7 MR. KNORR: right.

8 CHAIRPERSON WALLIS: That doesn't tell me
9 when you're going to catch it.

10 MR. KNORR: We have just recently, in the
11 last couple of weeks, gone through and done another
12 look at our manholes. We have discovered that in some
13 cases the manholes we are not able to pump down to a
14 level where the cables in the manholes are completely
15 uncovered and dry.

16 And as you remember, our commitment is no
17 matter what, whether they're dry cables, wet cables,
18 whatever, we're going to be inspecting these things
19 and doing some inspections on them nonetheless.

20 However, we are in the process of doing
21 some modifications to some of these manholes to make
22 sure that we can pump them completely dry, and we'll
23 continue to do that. I do not happen to know what the
24 commitment is, but I believe it's some time in the
25 next year that those modifications are going to take

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 place.

2 CHAIRPERSON WALLIS: Okay. Let's move on.

3 MR. KNORR: Okay. We had quite a few
4 commitments. One of the concerns that the ACRS had
5 was whether or not we're going to meet our
6 commitments. In the SER, you know we have 72. Seven
7 of them that are in the SER are already complete.
8 Each of these commitments is managed, and we'll talk
9 a little bit more of that in another slide I've got
10 here in a second, in our regulatory information system
11 and tracked to completion using our corrective action
12 program.

13 For every one of our commitments we
14 actually take a corrective action program item out,
15 and actually I've been doing that based on our draft
16 SER so that we have the corrective actions in place
17 and tied to each one of those, for instance, to
18 implement a particular program.

19 I've included every RAI that touched that
20 program, the basis document for the program so that
21 when someone opens up that corrective action program
22 item and knows that he has to build a bolting
23 integrity program, for instance, he knows what all of
24 the current licensing basis information is behind it
25 and can actually build the program correctly.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRPERSON WALLIS: Now, I notice that
2 many of these commitments are for implementing
3 enhanced programs in some area.

4 MR. KNORR: That's correct.

5 CHAIRPERSON WALLIS: Implement and
6 enhance, blah, blah, blah, the program.

7 MR. KNORR: Right.

8 CHAIRPERSON WALLIS: Now, is this because
9 the program all along had deficiencies or because of
10 license renewal? You need to enhance the program
11 because of something special about license renewal or
12 what is it?

13 MR. KNORR: I think your second is the
14 best way to describe it.

15 CHAIRPERSON WALLIS: Well, what's so
16 special about license renewal that means that you have
17 to enhance everything?

18 MR. KNORR: There are some requirements in
19 the GALL that are above and beyond the normal kinds of
20 programs that we would have had under Part 50, and we
21 have programs in place. They're existing programs,
22 but those programs have to be enhanced, and those
23 enhancements are described in our program basis
24 documents to make sure that those enhancements are
25 included.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 For instance, I think one of them is
2 random testing of bolting. For instance, this is not
3 included in our existing program under our current
4 licensing basis, and that is an enhancement that will
5 be required, and in fact, we're already --

6 CHAIRPERSON WALLIS: And this would be
7 because the bolts are older or something. It makes
8 more sense to --

9 MR. KNORR: This is for actually new
10 bolts.

11 CHAIRPERSON WALLIS: For new bolts?

12 MR. KNORR: Coming in, absolutely. To
13 make sure that those bolts have some integrity to
14 them, correct.

15 CHAIRPERSON WALLIS: So you have more
16 strict requirements for the new licensing period than
17 you had before, even though the bolts are new.

18 MR. KNORR: That's correct.

19 We have a new Chapter 15 in our FSAR
20 that's going to contain all of this programmatic and
21 TLAA related license renewal information, and there
22 are lots of sections that I'm sure you've seen in the
23 SER of the FSAR sections that are going to be revised
24 to include the changes that are resulting from the
25 LRAA review.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 Commitment management. To make sure those
2 commitments are done, when the safety evaluation is
3 actually issued by the NRC and we've actually taken
4 the last version that we have gotten from the NRC, all
5 of those commitments are included into our regulatory
6 information system. We will take out for every one of
7 those commitments in the SER T-track or passport
8 corrective action item. However, we also will be
9 entering those into a license renewal implementation
10 management program that we have in the license renewal
11 crew to make sure that those are tracked as well as
12 all the small items that have to be done to make sure
13 that they meet the requirements of the SER and of our
14 basis documents and to make sure that those activities
15 are implemented correctly.

16 So we're actually double and sometimes
17 triple tracking to make sure that this stuff is done
18 correctly.

19 In terms of implementation, this is one
20 item that the industry is dealing with right now, and
21 we're somewhat of a leading edge here. Our project is
22 actually carefully budgeted through the next year, and
23 we're going to be spending the next year implementing
24 and doing all of the changes to call-ups procedures,
25 et cetera, to make sure that we're 90 percent-plus

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 done with our job.

2 Procedures are being marked up. Some one-
3 time inspections have already been completed. We did
4 some inspections this last outage on Unit 2, and a few
5 things that we've looked on Unit 1 as well.

6 This implementation is going to continue.
7 We've identified some organizational changes that are
8 going to be needed at the site, at Point Beach as well
9 as the rest of the fleet. Commitments are going to be
10 completed prior to a period of standard operation or
11 sooner, and our focus is on sooner. The sooner these
12 can get into the lexicon of what's happening at the
13 plant I think the better off all of us are.

14 Individual tasks for each commitment not
15 completed by the end of 2006, even though they are not
16 commitments in the SER. If we've identified a
17 particular call-up that needs to be changed and it
18 hasn't been changed by the end of 2006, we will take
19 a corrective action program item out on that to make
20 sure that it's done.

21 And at present, because of the
22 implementation that we've been doing all along here,
23 we're about 20 percent done with that implementation.

24 And that's the end of my presentation.
25 Any other questions?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 (No response.)

2 MR. KNORR: Thank you very much.

3 CHAIRPERSON WALLIS: Thank you.

4 MS. RODRIGUEZ: Good morning. My name is
5 Veronica Rodriguez. I'm a project manager within
6 License Renewal, and I'm here to present the staff's
7 safety evaluation report for the Point Beach Nuclear
8 Plant Units 1 and 2.

9 Along with me I have Rodrigo De La Garza,
10 who is going to be helping me with the computer, and
11 Patricia Lougheed, a lead inspector for Region 3, who
12 is going to be talking about the follow-up inspection
13 findings and some highlights on their current
14 performance.

15 I would like to recognize the presence of
16 these staff reviewers who are sitting in the audience
17 and will be helping us with your questions.

18 Next slide.

19 Quickly, some highlights about Point
20 Beach. Point Beach is a two unit PWR located in east
21 central Wisconsin on the west shore of Lake Michigan.
22 The Unit 1 operating license expires on October 5,
23 2010, and the Unit 2 on March 8th, 2013.

24 On February 25, 2004, the applicant
25 requested a 20-year license extension. As part of the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 license renewal process, the staff has performed
2 several audits and inspections. Among these, a
3 scoping and screening methodology audit, an AMP audit,
4 and AMR audit, a combined scoping, screening, and AMP
5 regional inspection, and lastly, a license renewal
6 follow-up inspection performed during the week of
7 August 15.

8 The SER with open items was issued on May
9 the 2nd, 2005. It contained five open items, two
10 related to aging management programs, three related to
11 aging management reviews. It had 15 confirmatory
12 items and three license conditions.

13 The final SER was issued on October 1st.
14 All open items and all confirmatory items were closed,
15 and one license condition was slightly modified to
16 incorporate the applicant's PTS commitments.

17 Like I previously said, the SER contained
18 five open items. The first one is related to the in-
19 service inspection program. On this specific open
20 item, the staff rejected the use of relief requests as
21 exceptions to the GALL report. The staff requested
22 the applicant to provide technical justification for
23 their exceptions and to explain how these exceptions
24 affect aging management.

25 The applicant did provide their technical

1 justifications and concluded that most of these
2 exceptions did not affect aging management, and
3 subsequently they were withdrawn.

4 The second open item is related to the
5 bolting integrity program. On this specific open
6 item, the staff requested the applicant to provide
7 specific exceptions to the EPRI documents. The
8 applicant did provide these exceptions and their
9 technical justifications, and they also committed to
10 perform random hardness testing.

11 On this open item, the applicant's
12 justifications were found acceptable by the staff and
13 the Region 3 staff.

14 And the third open item is related to PWR
15 containment. We already talked about this; the
16 applicant did. On this specific open item, the
17 methodology used to address loss of material due to
18 corrosion in the containment liner plate was found
19 unacceptable. Therefore, the applicant committed to
20 include an evaluation, repair and replacement
21 requirements in the in-service inspection aging
22 management program. This was found acceptable by the
23 staff.

24 These two open items are very similar.
25 The issue here was that the aging effect was only

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 managed by using the water chemistry control program.
2 On the first one we're talking about loss of material
3 of steam generator components like the steam flow
4 limiter that are in contact with primary water.

5 On this specific open item, the applicant
6 stated that these components are made of a corrosion
7 resistant material and that there were no industry or
8 plant specific operating experience showing loss of
9 material, and that's basically due to strict water
10 chemistry control in the steam generators.

11 The staff revisited the guidance and
12 concluded that the applicant's justifications are
13 okay, and in fact, consistent with the updated GALL.
14 This was found acceptable.

15 The last open item, we're talking about
16 cracking of components in the CCW system. On this
17 item, the applicant committed to use the one time
18 inspection program in conjunction with the water
19 chemistry control program and found acceptable.

20 Of all the confirmatory items, I would
21 like to talk about this confirmatory item that relates
22 or it talks about scoping criteria. On this specific
23 confirmatory item, the applicant revised their scoping
24 methodology by a letter dated April 29th. In this
25 letter, the applicant removed the exposure duration

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 term and changed their methodology and their invoking
2 a new spaces approach. In this approach, the
3 applicant assumes that an interaction between a non-
4 safety related and a safety related component could
5 occur if they are located within the same space.

6 Therefore, the scope was expanded.
7 However, there were no new aging mechanisms
8 identified. The new tables and items were added in
9 Sections 2 and 3, and the applicant identified 14 new
10 component types within the scope of license renewal.

11 This new methodology and the scope
12 expansion was reviewed by NRR and the Region 3 staff
13 and was found acceptable, and no emissions were
14 identified.

15 DR. SHACK: I have a question about one of
16 the confirmatory items that isn't covered there, and
17 that's the loss of fracture toughness due to the
18 thermal aging embrittlement. It says that the
19 licensee is going to use enhanced volumetric
20 inspection that meets Appendix 8 demonstration
21 requirements.

22 Have people done that before? I mean
23 ultrasonic inspection or volumetric inspection of cast
24 stainless steel is rather difficult to do. Have
25 people demonstrated Appendix 8 type performance?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MS. RODRIGUEZ: On this specific
2 confirmatory item, and I was telling Tanny about it,
3 we need to make an editorial change because the
4 applicant committed to do VT or flaw tolerance
5 evaluations.

6 DR. SHACK: Okay.

7 MS. RODRIGUEZ: So if you go to your
8 Appendix 8 table, it's correct in the Appendix 8
9 table, and we're going to make this editorial change,
10 and it will be reflected in the NUREG.

11 DR. SHACK: So they really are going to do
12 either the flaw tolerance evaluation --

13 MS. RODRIGUEZ: Correct.

14 DR. SHACK: Do we know of anybody that's
15 done an Appendix 8 ultrasonic demonstration for cast
16 stainless?

17 MS. RODRIGUEZ: I'm not sure.

18 DR. SHACK: Is that something that's out
19 in the future?

20 MS. RODRIGUEZ: Tim?

21 MR. STEINGASS: Tim Steingass, NRR,
22 Division of Component Integrity.

23 I agree with your concern. The industry
24 is has had a lot of difficulty in getting a good
25 Appendix 8 UT examination done on cast austenitic

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 stainless steel. They have had some improvements
2 through the use of phased array technology. The one-
3 sided examinations have been performed, but as you
4 know, one-sided examinations through ultrasonic
5 examination do not meet the qualification criteria of
6 Appendix 8.

7 So that type of information is informative
8 in that it performs a marginal information only, best
9 effort examination. So I agree with your concerns,
10 and it's consistent with what industry has found.

11 MS. RODRIGUEZ: Next slide.

12 On June 9th, 2005, the ACRS submitted
13 their interim report letter summarizing their LRA
14 review findings. The EDO and the staff responded to
15 the ACRS letter by letter dated July 15th.

16 Quickly, some highlights on our response
17 under license renewal. We gave a brief overview of
18 the rule, and we explained how 10 CFR 5430 states that
19 current performance is considered to be outside the
20 scope of license renewal.

21 We also stated that AMPs and AMRs were
22 audited and inspected, and that a routine follow-up
23 inspection was going to be performed.

24 In addition, if the license is granted, a
25 post approval license renewal inspection will be

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 performed following the guidance in IP-71003.

2 For actions under the ROP, we stated that
3 the region is assessing the Point Beach performance in
4 a quarterly basis, and cull inspections were to be
5 performed during the summer, and that additional PI&R
6 schedules were currently scheduled for the calendar
7 year '07 and '09.

8 And lastly, once the red findings are
9 closed, MCO-305 allows up to 200 hours of direct
10 inspections.

11 With this I'm going to leave Patricia
12 Lougheed.

13 MS. LOUGHEED: Okay. I'm going to discuss
14 the follow-up inspection and then go on into the
15 current performance.

16 During the follow-up inspection, we had
17 identified three areas which we needed to look into
18 further. One was the scope of expansion that Veronica
19 touched upon, and we looked at what was being left out
20 under the new spaces approach to determine if there
21 was anything else that needed to be brought into
22 scope; looked at the one time inspection program
23 because of the additional components and commitments
24 the licensee had placed on it; and then we looked at
25 the corrective action program specifically in regard

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 to the applicant's ability to finish and complete the
2 commitments that they were making under the license
3 renewal application in time for the period of extended
4 operation.

5 We found that the license or -- excuse me
6 -- the applicant had made progress in all of these
7 areas. We were satisfied with the actions being taken
8 in regard to the corrective action program for the
9 license renewal commitments. We believe that there
10 are sufficient actions in place by the utility that
11 there's reasonable assurance that the commitments will
12 be completed prior to the period of extended
13 operation.

14 DR. KRESS: When you looked at the spaces
15 approach --

16 MS. LOUGHEED: Yes, we looked at the
17 spaces approach.

18 DR. KRESS: -- did you find the things
19 that weren't in scope that should have been?

20 MS. LOUGHEED: During the initial
21 inspection done in March of 2005 -- four -- March of
22 2005 -- excuse me -- we did find some additional items
23 that needed to be brought in. That's why we had put
24 it on that we need to do a follow-up inspection.

25 During the follow-up inspection, we did

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 not find any additional items.

2 DR. BONACA: Now, we heard that according
3 to the implementation of license renewal commitments
4 is 20 percent complete, which means that close to 70
5 or 80 percent will be performed after license renewal
6 has been approved.

7 MS. LOUGHEED: No, sir. I agree that the
8 current probably is about 20 percent. That's a little
9 bit higher than it was when I was out in August. The
10 remaining 80 percent is scheduled to be completed
11 between now and the period of extended operation.
12 It's not to be completed after.

13 DR. BONACA: No, I know. I never said
14 that. I said after, after the SER has been approved
15 and the license is issued.

16 MS. LOUGHEED: That's true. That's
17 similar to other plants.

18 DR. BONACA: And I think that our concern
19 was related to this period of time when there will be
20 action taking place. There will be no NRC involvement
21 on those issues until you get into the special
22 inspection for license renewal, and so that's the one
23 that we saw committed to in the letter that we
24 received from the staff in response to ours.

25 And so we would like to understand better

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 how that license renewal inspection, which is done on
2 a simple basis, addresses the concerns we raised, and
3 the recommendation we provided, which was the one of
4 augmenting inspections.

5 MS. LOUGHEED: It's true that from a
6 license renewal aspect we will not be doing anymore
7 inspections up until the 71003, which is right prior
8 to the period license of extended operation.

9 However, under the current revised
10 oversight program, reactor oversight program, we are
11 continuing to do a number of inspections which will be
12 looking at areas because, as I said, the majority of
13 these programs are already implemented, and so we will
14 be continuing to look at them in terms of their
15 implementation throughout the next six years as we go
16 forward.

17 We have programs. For example, one of the
18 programs that's not been mentioned a lot, but we have
19 a program -- the applicant has a program on open cycle
20 cooling water. We do specific inspections in that
21 area every two years, and as part of those inspections
22 we'll be following up on outstanding commitments the
23 licensee has.

24 We do inspections on in-service inspection
25 every outage, and as part of those we'll be evaluating

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 the licensee's progress. We do inspections on the
2 corrective action program. Right now they're on an
3 accelerated program, but at minimum it will be every
4 two years that we will be going in and looking at the
5 corrective action program.

6 We also have the resident inspectors there
7 full time. They will be looking at things as they
8 come up during the outages. Some of the special tests
9 being done for the one-time inspection program. I
10 can't guarantee every one of them, but because they
11 are special tests, it's very likely that the residents
12 will be taking a look at those.

13 We have a lot of inspection that goes on
14 for the current program. At least it is our belief
15 in the region that this inspection is sufficient to
16 insure that the applicant is or that the licensee is
17 operating safely under the current program.

18 DR. BONACA: Let me ask you a question
19 now, still on this issue. Again, IP-71003, I've been
20 looking at it. It says very clearly that you will
21 perform an inspection on a sample basis. Okay?

22 Are you ever making changes to the size of
23 the sample based on what your expectations are, what
24 your concerns are, and so on and so forth, or is it
25 just a routine inspection that you perform?

1 That's the question I have. I mean, are
2 you defining the sample at some level that says, you
3 know, we are concerned about this licensee's abilities
4 ultimately to expand the sample, or don't you?

5 I mean, that's the technique that is used
6 in almost everything that we do. I would like to hear
7 about how do you treat the definition of a sample.

8 MS. LOUGHEED: That's kind of hard because
9 in Region 3 we have not done any of the incident
10 inspections yet. 2009 is when our first plant, the
11 current license expires. So we've got another three
12 years before we'll really get into it.

13 I can tell you that for these 71002, which
14 is the inspection that I did this year on Point Beach,
15 it said to do it on a sample basis. Well, for us, our
16 sample was about 75, 80 percent of the systems that
17 were being looked at. So when it came to the out-of-
18 scope equipment, again, it said that we had to look at
19 one system.

20 We looked at about 15. I know that some
21 of the utilities complained being in Region 3 because
22 we tend to take that work sample very rigorously, and
23 if we have problems, we do expand the scope, and we
24 tend to have rather thorough inspections that try to
25 look into as many areas as we can.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 I would say that, yes, I would probably
2 expand the scope not just for this one, but for D.C.
3 Cook, which has a longer period out there and had much
4 higher level commitments; that we would tend to have
5 larger samples than we would for a plant like Dresden
6 and Quad Cities where we know they are implementing
7 them right now; that they've gone ahead and
8 implemented all of these programs prior to the period
9 of extended operation.

10 You know, granted, in three years I may
11 not be the person doing the program, but right now I
12 would say, yes, that we would tend to expand our
13 sample depending on the concerns we have with the
14 plant.

15 Yes, Steve.

16 MR. UNIKEWICZ: I'm not sure. Did you
17 have a question for me?

18 MS. LOUGHEED: Over here is Steve
19 Unikewicz. He was the person on -- one of the people
20 that was on that inspection back in July and August on
21 the engineering inspection, and I kind of tapped on
22 him because the issues that were raised there, I felt
23 that he probably could give a better explanation than
24 I could since I wasn't on the inspection.

25 MR. UNIKEWICZ: I'm not quite sure what

1 your questions were. At least to the item that Pat
2 had mentioned to me , to the issue with the UHR plump
3 and the minimum flow recirc. was current Point Beach
4 is going through an engineering calc. and
5 reconstruction process, if you will. They're
6 attempting to reconstruct and revalidate many of their
7 ECCS calculations and many of their design basis
8 calculations.

9 During the inspections, almost every two
10 out of three analyses that we looked at had some
11 problems with it. In this particular case what it was
12 was there was some basic assumptions made back in the
13 mid-'80s and '90s on RHR pump minimum recirc. Now,
14 RHR minimum recirc., there's an issue in the industry
15 in that it tends to dead head the pump.

16 So we have had a lot of industry guidance
17 in 9804, which in, among other things, that say you
18 need to minimize time running at min flow recirc.

19 They recognized that at one point in time.
20 However, what they didn't do is Point Beach has some
21 operating scenarios and some accident scenarios where
22 they actually do run on min. flow recirc. Well, the
23 fact is when they looked at their current design and
24 they did some evaluations, they recognized that they
25 can only run it for about a half an hour before

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 potentially damaging the RHR pump.

2 They never translated that back into the
3 EOPs. So you had points in the EOP where somebody
4 didn't recognize that, my gosh, as soon as this thing
5 is running 20, 25 minutes I need to shut it off or
6 else I need to somehow do some system alignments to
7 bring the pump and let the pump run a little better,
8 move it along on this curve.

9 That was one of the issues that we caught
10 as part of the -- the team caught -- as part of the
11 inspections, and that was the inability to translate
12 known operating information, analyze information into
13 operating procedures.

14 Now, they did put in, you know, because of
15 questions in the '80s and '90s a full flow test line.
16 That full flow test line does a couple of things. One
17 of the things it does is within the IST program and
18 within tech. specs., it verifies the operational
19 readiness of the RHR pump.

20 However, since that is not -- what you're
21 looking for in some cases in the IST is to take a
22 minimum case, a worst case where the pump is not going
23 to be operating where you want it to be, and really
24 make sure that it can operate where that it can at
25 that point for a while.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Well, they're not doing this. Since
2 they're running the full flow test at closer to
3 maximum flows, the pump runs a little bit smoother.
4 The pump sort of likes it up there.

5 The problem is in those conditions where
6 you're asking it to run on min. flow recirc., you're
7 not testing it down there. The pump starts shaking.
8 The pump starts to overheat. They're just not looking
9 at what happens down there.

10 That was the issue. Now, what they've
11 done for a corrective answer, I don't know the answer
12 to that, Pat, because I haven't followed up on it.
13 It's a matter of a phone call to get that answer.

14 But that was the issue, is the translation
15 of design information back into the EOPs, and they
16 really do. At least on this case they have two
17 operating points. They have a min. flow operating
18 point, and they have a max. flow operating point.
19 This is not an uncommon occurrence. This is something
20 we're seeing more and more. It's not necessarily
21 unique to Point Beach, but where they failed is they
22 failed to recognize it within their testing
23 procedures.

24 I don't know if there's any other insights
25 I can offer.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRPERSON WALLIS: Well, I couldn't
2 figure out if the problem was resolved.

3 MS. LOUGHEED: And I think what Steve is
4 saying is that it has not been resolved or he does not
5 have information on the resolution, and I'll be
6 honest. I do not have information on the resolution
7 either. We would have to get back with probably the
8 resident.

9 CHAIRPERSON WALLIS: Well, this story
10 seems to be somewhat tangled, and does this indicate
11 that they didn't do a good job of figuring out how
12 these pumps work in the first place?

13 MR. UNIKEWICZ: The answer to that is yes,
14 they didn't have a good idea.

15 CHAIRPERSON WALLIS: Or is this typical of
16 how they do other things?

17 MS. LOUGHEED: This was typical of the
18 industry, sir.

19 CHAIRPERSON WALLIS: Typical of the
20 industry?

21 MS. LOUGHEED: Yes. At the time when
22 these pumps were put in, there was a belief that the
23 minimum recirc. only needed to be a few gallons per
24 minute, and over the years we have found that that was
25 not the case, that the pumps needed as much as one

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 quarter of their normal flow to be able to maintain
2 themselves in recirc.

3 And it was something that was not
4 understood at the time the plants were made. So a lot
5 of plants have gone back and made retrofits to --

6 CHAIRPERSON WALLIS: Does this affect
7 long-term cooling or what does it affect?

8 MS. LOUGHEED: It affects the ability of
9 the RHR pumps to perform, I guess, in a long-term
10 cooling situation if they stay on recirc.

11 Now, as you say, there are ways that
12 things can be done, for example, that got this full
13 flow test line. The operators can take action to open
14 up a valve so that they have more water going down the
15 test line.

16 CHAIRPERSON WALLIS: But especially if the
17 system works as designed.

18 MS. LOUGHEED: Absolutely.

19 CHAIRPERSON WALLIS: It's not necessary
20 for the operator to do something special to achieve
21 his objective.

22 MS. LOUGHEED: You're absolutely correct.
23 This is a case though where the pump is not injecting
24 as was designed to do but is running in standby
25 because it has received an initiation signal, but the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 pressure on the reactor vessel has not dropped enough
2 for it to inject.

3 So it's one of those pieces where the
4 design of the pump is to do one thing, but it's not
5 quite in the mode where it can do it.

6 MR. UNIKIEWICZ: Right. It's in its long-
7 term, slow moving events where normally you would
8 actually see this pump come in operation within half
9 an hour or so, but in long-term events where it may
10 stretch on for an hour or two hours, such longer
11 periods of time before they actually pull it into
12 service and open up I'll say the normal accident
13 operating alignment.

14 DR. BONACA: So the issue is not its
15 performance during the accident or the end of the
16 accident. The issue is the recirculation mode --

17 MR. UNIKIEWICZ: Correct.

18 DR. BONACA: -- as it stands by.

19 MR. UNIKIEWICZ: That's correct, and the
20 concern, again, is that if you're sitting in a
21 recirculation mode for too long of a time, am I going
22 to damage the pump to the point when I ask it to
23 perform its design basis function, it's not going to
24 be able to do it because I ruined it in the first 45
25 minutes.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MS. LOUGHEED: And part of this comet
2 because when we originally licensed a lot of these
3 plants, we only considered the large break LOCAs, and
4 when we started looking at small break LOCAs, we found
5 there were different phenomena such that the RHR pump
6 might be needed, but not be needed immediately.

7 MR. UNIKIEWICZ: And this is not an
8 immediate inoperability concern, nor was it an
9 inoperability concern at the time because there was
10 adequate testing to show that in the current
11 configuration the pump was operable. There was enough
12 in-service test data. There was enough operational
13 data to say as it currently sat, it's okay.

14 I suspect that corrective action is to put
15 steps into the EOPs to do those types of things for
16 operators to recognize this condition exists. Again,
17 that's why we have -- there isn't physical
18 modifications. The only other physical modification
19 would be to increase the size of that recirc. line.
20 Certainly one of the options, not necessarily the
21 best.

22 DR. BONACA: Now, on a separate issue, a
23 different issue --

24 CHAIRPERSON WALLIS: Well, I'm sorry. I
25 don't get a feeling that you've resolved the problem,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 and you've told me that it's an industry-wide problem.
2 So I'm sort of left wondering what's going on here.

3 MS. LOUGHEED: Well, it has been an
4 industry-wide problem in terms of -- but most plants
5 have resolved it, and --

6 CHAIRPERSON WALLIS: By procedures?

7 MS. LOUGHEED: In some cases by
8 procedures. In some cases it has been through
9 installation of new --

10 CHAIRPERSON WALLIS: But in a bigger pipe
11 or something?

12 MS. LOUGHEED: Putting in a bigger pipe,
13 yes, sir, and it's very much on a case-by-case basis.
14 As I said, I don't have the information about how they
15 resolved it, and I would have to get back with you.
16 I would have to call the resident and find out what
17 corrective actions were taken, and I can certainly do
18 that, but it would probably be after this meeting is
19 over.

20 MS. RODRIGUEZ: We can see if the
21 applicant has an answer for us.

22 CHAIRPERSON WALLIS: Are you asking now?

23 MS. RODRIGUEZ: Yes. Are you aware if you
24 have modified?

25 MR. KNORR: I just asked a few questions.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 This is Jim Knorr again from Point Beach.

2 I just asked my staff a few questions, and
3 we're not sure what the corrective action is. I can
4 make a phone call yet during this meeting and see what
5 I can find out.

6 CHAIRPERSON WALLIS: So how should this
7 committee respond when there's something sort of in
8 the air like this? Should we just leave it up to you
9 to fix it or what?

10 MS. LOUGHEED: Well, it is current
11 operations, sir, and to be honest, it was assessed by
12 the inspection team at the time and was deemed to be
13 acceptable under current operation that they were
14 willing to put it into the licensee's corrective
15 action program, and I can understand your qualms about
16 the way that we just put things into current
17 corrective action programs. I cannot defend that.
18 That is the way the program is done. That's what I
19 have to follow.

20 If you want to take it up as a separate
21 issue, that would be fine with me, but you know, we --

22 CHAIRPERSON WALLIS: It's like my house.
23 I've got leaks in the plumbing, and I'll fix it
24 someday and all that. It's not a really -- I'd never
25 get around to fixing it. So that doesn't convince me

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 that the right thing is being done.

2 MS. LOUGHEED: That is one of the items
3 that under the current reactor oversight program, the
4 Commission and the NRC as a whole have made a decision
5 that for items which are of very low safety
6 significance, that we will rely on the licensee to
7 make the decision as to when they will get around to
8 fixing it.

9 CHAIRPERSON WALLIS: And so now you've
10 told me it's very low. That's the first time I heard
11 that.

12 MS. LOUGHEED: And all I can say is the
13 reason I would say it was a very low safety
14 significance is that they did not issue a violation.
15 They did not issue an unresolved item. They basically
16 said they wrote a corrective action program document
17 and left it like that.

18 CHAIRPERSON WALLIS: So if you get a small
19 break and you're a long, long time down the road;
20 you've ruined the pump because of something you've
21 done and you want to bring the temperature down. You
22 can't do it except by doing something special. That's
23 the situation.

24 MS. LOUGHEED: No, sir.

25 CHAIRPERSON WALLIS: It's not?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MS. LOUGHEED: The situation is that when
2 you are in a small break LOCA or a long running event
3 that the operator needs to recognize that he can only
4 run the pump for half an hour or a little bit less
5 before he adds or gets a better flow path for it.
6 Okay? So that can be opening up the test line. That
7 can be turning the pump off, and it would be within
8 what would be the capability of an operator at that
9 point in the scenario that he would be able to
10 evaluate his equipment status, and --

11 CHAIRPERSON WALLIS: So you have now put
12 this all in the record. So some day when there's a
13 small break LOCA we'll find out if --

14 MS. LOUGHEED: Then you can say it's all
15 my fault. Yes, sir.

16 CHAIRPERSON WALLIS: Okay.

17 (Laughter.)

18 DR. DENNING: Let me follow up just a
19 little bit more on that. Are there now in the
20 emergency operating procedures a recognition of this
21 or are there not?

22 MS. LOUGHEED: The answer to that is I do
23 not know. At the end of the inspection it was left
24 that the licensee wrote corrective action documents
25 identifying the problem. We speculate that they may

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 have fixed the EOPs, but to get the answer to that,
2 either the applicant or myself would have to make
3 phone calls.

4 DR. BONACA: I think we should make phone
5 calls just to bring up this issue just in answer to
6 the ACRS. We're going to be here for the next two
7 days, three days.

8 MS. RODRIGUEZ: I can certainly get this
9 action item and get a response to the ACRS, but I
10 would like to recognize that this doesn't have to do
11 anything with license renewal.

12 DR. BONACA: It doesn't matter when you're
13 asking a question regarding the issue.

14 MS. LOUGHEED: And I have made no --

15 DR. BONACA: Some of these things have to
16 do also because I'll give you an example. This
17 morning we heard about the containment coating. Okay?
18 Now, there is an issue being raised there. Is there
19 a program, a license renewal that will deal with the
20 containment coating?

21 MS. RODRIGUEZ: Actually I have an answer
22 for you.

23 DR. BONACA: Okay. So you see, they have
24 findings. You have issues, and they have oftentimes
25 a hook into the license renewal.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MS. RODRIGUEZ: Coating is not currently
2 addressed in the GALL. However, we have the GSI, and
3 we have processes to incorporate this into the GALL.
4 After the NRC decides what we're going to do with this
5 coating issue, this will be in the ISG process, and
6 after that gets approved, we're going to supplement
7 the GALL with a resolution for the coatings problem.

8 I understand. Now, we have one open item
9 that's not an open item, but I'm saying is an issue
10 that has to be dealt with as you develop an ISG. Now,
11 since Point Beach is still reviewing, inspecting,
12 finding errors, we heard a lot of issues, errors in
13 engineering and so on and so forth; it's likely that
14 over the next few years, there are going to be other
15 issues identified of this nature, and there will be
16 some need for them to address them within the license
17 renewal space, some of them, and that's why the
18 importance and our insistence on an appropriate
19 inspection level is thorough enough before walking
20 into license renewal to cover all of these items.

21 And that's why the scope, okay, that has
22 to be inspected, I think, in my judgment has to be
23 larger than normal. So that's why we're asking these
24 questions. They're not -- we understand the
25 separation between current licensing basis and license

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 renewal, but there is also a link. There are many
2 links out there, and we have tried to explain them in
3 our letter.

4 So that's the reason why --

5 MR. GUILLESPE: Yes, I think, Mario, once
6 they get a renewed license, that's the license, and so
7 the normal ROP will be inspecting against that new
8 license in all of those lists of commitments.

9 DR. BONACA: I understand that, but you
10 know, the fact itself that you find a problem here
11 with the containment coating raises a new issue that
12 has not been addressed within license renewal.

13 MR. GUILLESPE: That's true, but it's
14 being addressed both for this plant and likely going
15 to have to now be addressed generically across the
16 whole industry.

17 DR. BONACA: I understand that.

18 MR. GUILLESPE: As a current problem.

19 DR. BONACA: Yes, and frank, but the point
20 is what else is going to come up after you are granted
21 the --

22 MR. GUILLESPE: Oh, I think we're going to
23 continue to see things come up at every plant.

24 DR. BONACA: So let's just do it. Let's
25 go ahead and make commitments and then we'll inspect

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 them before they walk in for license renewal.

2 MS. LOUGHEED: And that is one of the
3 things I'd really like to point out, is that we are
4 continuing to inspect; that we are not going to wait
5 until the period of license extended operation to look
6 at these things. We are inspecting them today. When
7 issues come up like containment coatings, like this
8 pump recirc., we are inspecting them. We are
9 following up on them.

10 I believe that I saw a couple of people
11 leave. I believe that they're going to be trying to
12 contact the site to get an answer to the question as
13 to what is going on now, but it is something that
14 would be followed now under the current operation
15 because if there is any hint that the pumps would not
16 be operable, that's something we want to know now.
17 It's not a licensing question.

18 But Steve's impression was that it was not
19 to the point that the pumps were inoperable.

20 MR. UNIKEWICZ: And, Mario, the team prior
21 to leaving always looks at their corrective actions,
22 and as is put into the program, part of the team
23 inspection is to look at the item that was identified,
24 look at the actions that are planned to be taken and
25 make sure that they are appropriate.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 If they were not appropriate at the time,
2 and again, I don't have details, and they were
3 unacceptable to the staff, and again, it was a group
4 of Region 3 folks; it was NRR staff involved also;
5 then they would not have been allowed to continue on.

6 Without looking at the --

7 DR. BONACA: I have no concern about that
8 issue.

9 MR. UNIKIEWICZ: Okay.

10 DR. BONACA: Because I know that you're on
11 top of it, and there has to be an interim solution as
12 well as a long-term solution that will come to the
13 corrective action program. It's identified.

14 I'm wondering about what is not being
15 identified right now that may be identified after the
16 ACR is granted, and so therefore, the only opportunity
17 you have is future inspections, and that's why we are
18 insistent on that.

19 MS. LOUGHEED: And that's how they would
20 be. A lot of things at Point Beach actually are self-
21 identified. The licensee has a very good program for
22 actually finding problems, which isn't to say that our
23 resident inspectors aren't also very good.

24 I'm getting a smile out of Jim Knorr.

25 But I mean, both the licensee and the NRC

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 are out there trying to find problems, and we find
2 them, we're making sure that they're getting
3 corrected, you know, appropriate to their
4 circumstances and their significance.

5 MS. LAND: I just wanted to say something.
6 This is Louise Land.

7 I'm talking about your questions about
8 coatings. I know that the licensee had talked about
9 the coating situation. I think it's important to
10 understand that's with our current analyses, and as
11 utilities look at the resolution of GSI-191 and the
12 new designs they are going to put into place for
13 December of '07, the analyses actually will be
14 changed because of the new designs, and of course, the
15 folks that are working on GSI-191 have been looking at
16 the coatings issue.

17 But as far as the current situation,
18 plants already have an analysis, and the discussion
19 that they had was in regards to what their current
20 analysis was, making sure that the coatings or that
21 the failures did not impact their current analyses.

22 CHAIRPERSON WALLIS: I just got some input
23 from the staff that there seems to be some doubt about
24 the probability of the CDF resulting from this RHR
25 issue really being a low thing. It's significant

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 risk, especially if you discredit the operator action.
2 It's a very significant risk.

3 MS. LOUGHEED: I cannot in any way comment
4 on the assessment that was made.

5 CHAIRPERSON WALLIS: It just seems that it
6 can't be left dangling. It has got to be effective.

7 MS. LOUGHEED: I understand that we do
8 have somebody trying to follow up, and we will get you
9 an answer.

10 CHAIRPERSON WALLIS: Thank you.

11 MS. LOUGHEED: I apologize that I didn't
12 have one prior to --

13 CHAIRPERSON WALLIS: That's all right.
14 Thank you.

15 MS. LOUGHEED: If there are no other
16 questions, I'll go on.

17 Next slide, please.

18 Okay. This, talking about the reactor
19 oversight process and where we are right now, and it
20 is Region 3's assessment that the current operation of
21 Point Beach, both units, is acceptable.

22 We continue to monitor that performance.
23 We are doing increased inspections at the current
24 time. We do have residents out there all the time.
25 We have increased management oversight at the site.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 They do remain in Column 4 of our revised
2 oversight program action matrix. The next time that
3 this will be looked at will be about March of 2006, is
4 when the next time NRC will meet to make a decision
5 whether to move them back to a lower column or to move
6 them into a higher one which would require shutdown.

7 Right now I do not have any information
8 one way or another. The confirmatory action item
9 does remain in effect.

10 We did do some special inspections over
11 the summer, and I'd like to kind of go over a few of
12 those. Their confirmatory action letter had five
13 areas where it had assessed Point Beach's operation as
14 being unsatisfactory.

15 Two of these areas have been returned to
16 the baseline inspection program. These are emergency
17 preparedness and engineering and operations interface.
18 Both of these were inspected over the summer.
19 Significant improvements were noted in the behavior of
20 these areas. We did not identify any findings greater
21 than green. In the case of emergency preparedness, we
22 did not identify any findings at all, and engineering
23 and operations interface, we had one finding that was
24 listed as green.

25 So we have returned them to the standard

1 baseline program. For engineering and operations
2 interface, that means that it will be evaluated by the
3 resident inspectors on pretty much a continuous basis,
4 and then it will be evaluated during engineering
5 inspections which are done on a biennial basis.

6 For emergency preparedness, again, the
7 inspectors look at that fairly continuously, and there
8 are specific inspections which are done on a biennial
9 basis.

10 There of the areas still remain open.
11 These are human performance, engineering design
12 control and problem identification and resolution.

13 NRC continues to assess all of these
14 areas. They do remain adequate for continued
15 operation. In the area of human performance, I can say
16 that there have been improvements noticed. However,
17 the area is continuing to be assessed because Unit 1,
18 I believe, is in an outage right now, and we tend to
19 notice human performance problems more during outages.
20 So we wanted to keep it open at least through the
21 outage to make sure that the improvement we had seen
22 was not going to slip again.

23 And the other areas unfortunately I can't
24 really talk any further about because some of it is
25 still pre-decisional.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MS. RODRIGUEZ: The staff has concluded
2 that there is reasonable assurance that the activities
3 authorized by the renewed license will continue to be
4 conducted in accordance with the current licensing
5 basis, and that any changes made to this current
6 licensing basis in order to comply with 10 CFR 5429
7 are in accord with the act and the NRC regulations.

8 If you don't have anymore questions, this
9 concludes our presentation.

10 DR. BONACA: Do we have additional
11 questions from the members?

12 CHAIRPERSON WALLIS: Do we have a moment?
13 Do we have a few minutes?

14 DR. BONACA: Un-huh.

15 CHAIRPERSON WALLIS: This probably is not
16 significant. I noticed that they were going to do
17 functional tests of fire rated doors. Do you take the
18 door off and take it away somewhere and test it or
19 what do you do to do functional tests of a fire rated
20 door?

21 I would think they already have been
22 tested before they were installed.

23 MS. LOUGHEED: That is true. They
24 probably were tested before they were installed, sir.
25 However, what they want to make sure is that the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 testing is not so much for the door itself, but for
2 the seals in the gaps.

3 CHAIRPERSON WALLIS: So you light a fire
4 behind the door and see what happens?

5 MR. SIEBER: No.

6 MS. LOUGHEED: Well, usually use something
7 else other than a fire that --

8 CHAIRPERSON WALLIS: But how do you
9 simulate a fire without having a fire?

10 MS. LOUGHEED: Mr. Thorgersen.

11 MR. THORGERSEN: This is John Thorgersen,
12 Point Beach program's lead.

13 I believe you're quoting out of our fire
14 protection program in which we manage the aging of the
15 fire doors. It is not talking about the fire testing
16 and rating of the doors. It's talking about
17 functionally testing things, such as the gap, as
18 Patricia had mentioned, the latch to make sure it
19 latches properly, inspecting the doors to make sure
20 there are no holes in the doors or gaps underneath the
21 bottom of the door.

22 CHAIRPERSON WALLIS: So it's not -- when
23 I read the words "functional test of fire rated
24 doors," I got the impression you're going to test
25 whether the door will stand up to a fire or not, and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 that's not what --

2 MR. THORGERSEN: That would be called a
3 fire test.

4 CHAIRPERSON WALLIS: So it's the words
5 that are confusing.

6 MR. THORGERSEN: Or a fire rating test.
7 A function test, you open it, close it, make sure it
8 closes properly, latches properly, that the gaps are
9 proper.

10 CHAIRPERSON WALLIS: Okay.

11 MR. SIEBER: That it will close by itself.

12 MS. LOUGHEED: Because it's one thing to
13 test the door. The other thing is the way the door is
14 installed, and that's what they're trying to look for.

15 CHAIRPERSON WALLIS: Well, I had a comment
16 on the SER if it's appropriate. It seemed to me that
17 there were lots of words used under every category
18 that came up as an issue, and sometimes it was hard to
19 me in all of the discussion, hard for me in all of
20 this discussion -- so far I called discursive sort of
21 commentary -- to tell if the issue was really resolved
22 in a logical sense or if it was sort of you give a
23 long commentary and then you say, "Well, we decided on
24 balance everything was okay.

25 It would be nicer to see a sort of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 crisper, logical derivation of this "okayness."

2 But it seemed to me on general, that this
3 SER seemed to be more thorough than some of the other
4 ones we've seen, perhaps because of the nature of the
5 plant and the history, and that's perhaps why you went
6 into more discussion of these various issues.

7 So in that side, I would compliment you --

8 MS. RODRIGUEZ: Thank you.

9 CHAIRPERSON WALLIS: -- for appearing to
10 be more thorough, at least putting in more action,
11 more stuff, but still I would like to see some of the
12 resolutions of the issues being crisper.

13 DR. BONACA: Anymore comments from
14 members, questions?

15 (No response.)

16 DR. BONACA: If not, I thank the staff and
17 the license people for the presentation.

18 MS. RODRIGUEZ: Thank you.

19 DR. BONACA: And I'll give the meeting
20 back to you, Mr. Chairman.

21 CHAIRPERSON WALLIS: So we have made up
22 time on this one.

23 DR. BONACA: A little bit.

24 CHAIRPERSON WALLIS: Thank you very much.

25 Thank you, presenters, for your presentation.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 We will now take a break until 10:15.

2 (Whereupon, the foregoing matter went off
3 the record at 9:52 a.m. and went back on
4 the record at 10:15 a.m.)

5 CHAIRPERSON WALLIS: The next item on the
6 agenda is grid reliability and its impact on plant
7 risk. I will hand the meeting over to my colleague,
8 Jack Sieber, to lead us through this one.

9 MR. SIEBER: Thank you, Mr. Chairman, and
10 good morning.

11 I'm going to depart from the standard
12 procedure of just making a brief introduction and
13 introducing the staff to speak because I think this
14 issue is a very complex issue not only from the
15 standpoint of understanding what's going on, but
16 knowing who all of the players are and what each one
17 of them is doing or attempting to do, where they are,
18 when they're going to be done, and how these things
19 interact with one another.

20 And to do that, I will talk a little bit
21 about the history, perhaps at the risk of duplicating
22 part of the staff's presentation. If I do that, then
23 I apologize in advance for it, but I will do it
24 anyway.

25 (Laughter.)

1 MR. SIEBER: You know, grid instabilities
2 have been with us for almost ever, since that is in --

3 DR. POWERS: Since there was a grid.

4 MR. SIEBER: That's right. When we
5 invented grids, instability came along with it.

6 And in the history of disruptions, major
7 disruptions to the grid, basically we started with a
8 major disruption in 1965 in the northeast blackout,
9 which caused a blackout in New York City, among other
10 things. From a generation standpoint, the
11 Consolidated Edison, their largest generator called
12 "Big Alice" was a generator that did not have back-up
13 DC turbine oil pumps, and so when they suffered a loop
14 event, the turbine tripped, slowed down, and since it
15 had no lubricating oil, wiped its bearings and put it
16 out of commission for a long time.

17 That had some impact on nuclear power
18 plants, but in '65 there weren't very many. I think
19 Indian Point 1 was one of them, and so it did not
20 raise a major significance.

21 In 1996, in August, there were two major
22 blackouts in the West. Around Southern California was
23 the center, and that also caused loss of off-site
24 power events to a couple of nuclear plants.

25 On August 14th, 2003, a major part of the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Northeast and the Midwest in the United States and
2 parts of Ontario, Canada suffered a blackout that
3 lasted basically for a couple of days. It caused loss
4 of off-site power events to nine United States nuclear
5 power plant, eight of which were operating at or near
6 full power at the time.

7 Fortunately, on-site back-up power
8 operated properly for all of the nuclear power plants,
9 as they are designed to do. On the other hand, there
10 is some remaining concern that loss of off-site power
11 events are becoming more frequent and, therefore,
12 changes the probability of an accident should some of
13 the backup or mitigating systems fail.

14 Now, we got a report last year from the
15 staff, which is "Station Blackout Risk Evaluation for
16 Nuclear Power Plants," and it makes an interesting
17 statement, and it talks about the mitigating ability
18 based on SPAR analysis of plants to mitigate loop
19 events compared to the previous assumptions on that,
20 and if you read the conclusions, they find that the
21 overall results indicate the core damage frequencies
22 for loss of off-site power station blackout are lower
23 than previous estimates based on this study.

24 And it turns out that the reason why that
25 is is because the reliability of diesel generators has

1 been improving over the years, and that the estimates
2 previously used for basically on-site emergency power
3 systems frequency of failures was greater than the
4 current experience is.

5 Notwithstanding that though, it is clear
6 that a loop event, and particularly a station blackout
7 event, which would fall from a loop event where
8 mitigating back-up power systems would fail is a
9 significant contributor to core damage.

10 Now, the NRC recognizes this. The staff
11 recognizes this, and they have taken a number of
12 actions, and along with the Federal Energy Regulatory
13 Commission and the United States government, the
14 Congress, in fact, in April of 2004 following the
15 Northeast-Midwest blackout, a joint U.S.-Canadian task
16 force issued a report from their investigation which
17 found that several entities, in other words,
18 transmission companies, violated NERC operating
19 policies and planning standards, and the only way to
20 really fix this since the planning standards are not
21 enforceable at the present time, is to pass
22 legislation, enact that into law, and modify the
23 Federal Power Act in order to make the standards
24 exist, make everyone abide by them, and make them
25 enforceable via penalties.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 In April of 2004, FERC issued a grid
2 reliability policy statement. In September FERC asked
3 the Congress to legislate authority for FERC to
4 promulgate and enforce grid reliability standards.

5 August 8th, 2005, Congress passed and the
6 President signed into law the Electricity
7 Modernization Act, which adds Section 215 to the
8 Federal Power Act, and that establishes an electric
9 reliability organization, which is initialized as ERO,
10 to which regional bulk power organization or
11 transmission companies like PJM or ECAR or in the West
12 WECC would report.

13 And of course, this new entity would
14 establish and enforce the standards. Now, the
15 standards are being written as we speak by the North
16 American Electricity Reliability Council, which the
17 initials are NERC. So you have FERC and now you have
18 NERC. NERC is the standards writing, and FERC is the
19 overall federal commission that oversees this process.

20 Now, the desired outcome of the FERC
21 process is to provide enforceable standards in the
22 operation and maintenance of the transmission grid to
23 promote greater stability and to lessen the
24 opportunity for major power disruptions, including
25 loop events to nuclear power plants.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 Now, the NRC's interest, rather than
2 stabilizing the grid, the NRC's interest is having
3 nuclear power plants prepared to deal with grid
4 instability and, in fact, the interest really is our
5 licensees obeying the rules and regulations of Title
6 X, which is 50.63, which talks about on-site power
7 supplies; 50.65, which is the maintenance rule, which
8 says you have to take into account risk before you
9 remove equipment from service for maintenance.

10 And an example of this, a recent one, was
11 when the hurricane was coming into the United States.
12 One utility decided to take one of their diesels out
13 of service to do preventive maintenance. Now, that
14 may not be the wisest thing. You would have to take
15 an umbrella with you to the diesel generator. It
16 wouldn't be available for service when the loop would
17 occur, which it absolutely would occur under those
18 circumstances, and there are some other examples as to
19 where the maintenance rule needs to be more highly
20 respected, so to speak.

21 The third thing is GDC-17, which talks
22 about back-up power supplies.

23 In April of 2004, the staff issued and the
24 regions performed inspections to gather information
25 about the state of mind and the state of procedures

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 that utilities use to coordinate and contact their
2 system operator.

3 In November f last year, the staff briefed
4 us on this situation, and on April 12th of this year,
5 the staff issued a draft generic letter for public
6 comment, of which there were 14 commenters and lots
7 and lots of comments.

8 April 26th, the staff briefed the
9 commissioners, and the commissioners sent them a staff
10 requirements memorandum that says, "Go ahead with your
11 generic letter and get it out by December 15th," which
12 when I read that I underlined that because that's part
13 of the talk. The staff would like to do what the
14 Commission has told them to do.

15 And so now the staff has issued for
16 comments the draft generic letter, received the
17 comments back, analyzed those, prepared a final draft
18 generic letter, and so they are here to tell us about
19 their work.

20 Now, as part of this presentation, Mr.
21 Alex Marion from NEI has asked for a few minutes at
22 the conclusion of this session to make a statement on
23 behalf of the industry.

24 So without further ado, I would like to
25 introduce to you Ronaldo Jenkins, who is in charge of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the grid reliability program for the NRC.

2 Ronaldo.

3 MR. JENKINS: Good morning. I'd like to
4 thank you for your recap of where we are. You've done
5 a much better job than perhaps we would in this short
6 period of time that we have.

7 My name is Ronaldo Jenkins. I am the
8 Branch Chief of the Electrical Engineering Branch for
9 the Division of Engineering in the Office of Nuclear
10 Reactor Regulation, NRR.

11 I would like to thank the ACRS for
12 inviting the staff to today's meeting. The staff has
13 been working to resolve electrical grid reliability
14 issues, and the purpose of this presentation is to
15 present the draft generic letter or GL for your review
16 and endorsement.

17 Next slide.

18 As the agenda indicates, after my
19 overview, Mr. Paul Gill will discuss the public
20 comments on the draft generic letter and staff changes
21 to the document.

22 Mr. Bill Raughley from the Office of
23 Nuclear Regulatory Research will discuss the status of
24 supporting actions in concert with the North American
25 Electrical Liability Council, or NERC, to model

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 nuclear power plants in NERC planning models.

2 Next slide.

3 This is a list of acronyms that we
4 typically fall into and basically for those who are
5 not familiar, we will try to spell them out at least
6 initially.

7 CHAIRPERSON WALLIS: The first one is a
8 real problem for us.

9 MR. SIEBER: Yeah, I never did get that
10 one.

11 MR. JENKINS: Well, at least we got it
12 spelled right.

13 PARTICIPANT: Well, how is it pronounced?
14 Is it "acres"?

15 MR. JENKINS: Well, next slide.

16 This is the second list, and it seems as
17 time goes along we keep adding more and more acronyms.

18 MR. SIEBER: Is there such a thing as a
19 real time computer program that does line loss and
20 load float? I mean, is it really real time?

21 MR. JENKINS: It's real time from the
22 point of view of the updates. Typically, they are as
23 fast as every five minutes, and so they reflect the
24 state of the system.

25 MR. SIEBER: Well, they have built into it

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 equipment that is physically out of service or circuit
2 breakers that are physically open, but typically they
3 do a Monte Carlo analysis of the probability of
4 something else happening and what that will do to the
5 system from the standpoint of line loss and load flow;
6 is that correct?

7 MR. JENKINS: Well, they --

8 MR. SIEBER: It's probabilistic in nature.

9 MR. JENKINS: There's two types of
10 studies. One is if you're going to do a Monte Carlo
11 simulation, you're trying to identify what the
12 probability of something occurring.

13 MR. SIEBER: Right.

14 MR. JENKINS: Typically they do the load
15 flow analysis that determines what would be the
16 voltage if they lost a critical element, and so they
17 do this "what if" simulation repeatedly, and
18 independent system operators like PJM, they alarm
19 their systems such that if they lose a critical
20 element, the operator will be informed that they may
21 not be able to, for example, power nuclear power plant
22 buses.

23 So we've been talking with them over the
24 years extensively, and they are very much aware of
25 nuclear power plant needs.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. SIEBER: Yes, I would point out that
2 PJM, in my estimation, they were one of the survivors
3 of the 2003 blackout by being alert and on top of
4 things and taking action right away.

5 MR. JENKINS: Yes, that's the normal
6 response. The normal response is to isolate your
7 system and protect it. And when we talked to them
8 after the event, they basically said, "Well, we were
9 kind of lucky, but we were definitely looking to
10 contain it," once they were aware of it.

11 MR. SIEBER: Right.

12 MR. JENKINS: Next slide.

13 You already had talked about a lot of the
14 chronology, that on August 14th, 2003, the largest
15 power outage in the history of the country occurred in
16 the northeastern United States and parts of Canada.
17 Nine nuclear power plants tripped, and eight of these,
18 along with a nuclear power plant that was already shut
19 down, lost off-site power.

20 Although the on-site emergency diesel
21 generators, the EDGs, functioned to maintain safe
22 shutdown, this event was significant in terms of the
23 number of plants affected and the duration of the
24 power outage.

25 One of the responses on the staff's part

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 was to perform a deterministic risk evaluation and we
2 concluded that there was a certain urgency to address
3 the next summer to identify what issues that need to
4 be addressed in light of this event.

5 And at the November 4th, 2004 ACRS
6 meeting, we spoke of the concerns that we had
7 regarding the reliability of off-site power and
8 nuclear power plants.

9 And we used both risk informed assessment
10 and deterministic techniques to evaluate the safety
11 significance and the priority for these issues, and in
12 December of 2004, the staff concluded that a generic
13 letter was warranted based on those reviews and the
14 results of the temporary instruction 25.15-156, which
15 was conducted during the summer of 2004.

16 Next slide.

17 To conclude the chronology, the staff was
18 asked to issue the final generic letter by December
19 15th of this year. I would note that there were two
20 temporary instructions completed to assess the
21 operational readiness of nuclear power plants during
22 the summer periods of 2004 and 2005, and the results
23 both indicated a high degree of variability on the use
24 of nuclear power plant/TSO, or transmission system
25 operator, protocols.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 So moving forward, the next slide we talk
2 about the structure of the generic letter. How did we
3 arrive at the questions?

4 After the staff's assessment of the August
5 14th, 2003 blackout, we looked at the risk insights
6 and the regulatory requirements, and we developed the
7 regulatory information summary 2004-05.

8 We then based the general letter questions
9 on that risk, on that regulatory information summary,
10 and that risk was issued in April of 2004.

11 So short term, the staff's response was to
12 issue a temporary instruction for the summer of 2004,
13 and we issued the risk 2004-04 to communicate the
14 staff's expectations in this area to licensees.

15 The questions cover GDC-17 and technical
16 specifications, maintenance rule, and station
17 blackout.

18 I would like to turn it over if there
19 aren't any questions to Paul Gill for the next part of
20 it.

21 CHAIRPERSON WALLIS: Those four questions,
22 the subquestions, the actual number of questions is
23 very large.

24 MR. JENKINS: It's a reflection of the
25 complexity of the issues that are raised. We had a

1 choice. We could have devised eight questions that
2 were very general and broad, and then we would be
3 going back and forth, questions and answers, with
4 individual licensees or we could use the subparts to
5 narrow in on the areas of concern or areas where we
6 wanted additional information.

7 So we chose the subpart approach to
8 basically if the response was as we expected, then
9 there was no need for any further information. So we
10 thought that that would be more efficient than just
11 eight simple questions.

12 Yes, sir?

13 MR. SIEBER: It seems to me that to some
14 extent the efficacy of a licensee's answers to these
15 questions depends on the skill and ability and
16 infrastructure of the transmission system operator,
17 TSO. In other words, if you're running a power plant
18 and your TSO really doesn't have all of these tools
19 and is not a real good communicator, there is nothing
20 in place other than the FERC action, and we'll have to
21 see how that turns out; there's nothing in place to
22 sort of up the standards of the TSOs.

23 MR. JENKINS: I guess our main point is to
24 ask the questions to identify if there are areas of
25 concern, that is, compliance. How do you know that

1 your off-site power source is operable.

2 MR. SIEBER: Right.

3 MR. JENKINS: And as the licensees, that's
4 your responsibility. Now, if it turns out that there
5 are areas of weakness that exist, then we need to know
6 that.

7 MR. SIEBER: Okay. I'll ask one other
8 question and try to be quiet for a while.

9 Obviously the ultimate success here as far
10 as the goals that the staff has set forth in the
11 generic letter and from the standpoint of a more
12 reliability national grid system depends in my mind on
13 cooperation between FERC and the NRC, and I know by
14 reading through the reading list that FERC people have
15 gone to your workshops and there has been some
16 interaction, but I think that that is one of the
17 elements that's important, and as you go through, you
18 may want to address where that has occurred and what
19 success you think you've had.

20 DR. DENNING: I had a quick question, and
21 that relates to one of the bases for moving forward
22 here is the determination that there is a risk issue
23 involved here, and I was wondering if you additional
24 risk studies.

25 We've looked at the loss of off-site power

1 study and the static blackout studies that were done
2 by research, and neither one of those studies would
3 lead to -- I mean, there's some indication of a need
4 for having a high degree of surveillance in the future
5 to make sure that there is no problem here, but I
6 wouldn't say either one of those gave a perspective of
7 a risk that's higher than what we've believed the risk
8 of loss of off-site power has been for the last 25
9 years.

10 In fact, the perspective is certainly that
11 it's less than it was. Whether it actually is or
12 isn't, of course, there's some reasons why it almost
13 certainly is lower in terms of its diesel generator
14 performance.

15 But was there something other than these
16 studies that led you to draw those risk insights?

17 MR. JENKINS: Following the event, 2004
18 and August 14th, 2003, the staff convened an expert
19 panel, PRA panel, to try to get our arms around this
20 particular issue.

21 The studies you are referring to, they do
22 provide some good information. However, what we are
23 seeing is that there's an increase in risk in the
24 summer months, and basically that's one of the
25 studies, the earlier study that was done, that there's

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 an increased amount of risk.

2 Mike Cheok of the Office of Research, do
3 you want to add anything?

4 MR. CHEOK: I guess what I would like to
5 add is reference to the NUREGs, the draft NUREGs that
6 you were referring to. You're right that we show that
7 the risk has come down a little bit compared to ten
8 years ago for several reasons, but what we also found
9 was that on the average annualized basis, the risk has
10 come down, but if you break it down to the different
11 subparts, for example, if you just look at the risk
12 from grid alone, you find out that the risk has
13 increased, and we find out that things like, you know,
14 the dominance of events during the summer months also
15 causes a concern, and also the fact that the durations
16 of some of the events are getting longer may also be
17 causes of concern.

18 MR. JENKINS: And we have a slide that
19 shows basically some of the numbers. We'll show that
20 later.

21 MR. SIEBER: But from the standpoint of
22 public health and safety, which takes into account
23 everything, the risk has slightly declined.

24 MR. JENKINS: Right.

25 MR. SIEBER: And that's what I read here.

1 MR. JENKINS: And that's reflected in
2 previous comments where you noted that what we called
3 the plant centered events --

4 MR. SIEBER: Right.

5 MR. JENKINS: -- have decreased. So when
6 you add the total number of events from the three
7 different sources, whether plant centered and grid,
8 the plant centered portion has decreased, and that has
9 brought down the total number.

10 MR. SIEBER: I guess we're not asking
11 questions like this to pick on you, but to just make
12 sure there's a clear record as to what's going on.

13 MR. JENKINS: Right.

14 CHAIRPERSON WALLIS: I have a question for
15 you. These questions seem to have the intent of
16 determining whether or not the licensee is complying
17 with certain regulations.

18 MR. JENKINS: Right.

19 CHAIRPERSON WALLIS: I wonder had you
20 thought out how the answers to the questions enable
21 you to determine whether or not he is in compliance.

22 For instance, you've got such detailed
23 question, such as, you know -- just pick one -- how
24 frequently does the RTC program update. Now, if he
25 says five minutes, ten seconds, two hours, ten days,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 which one of those is in compliance?

2 And you've got all of these answers.
3 Someone has got to decide if this whole compendium of
4 answers puts the licensee in compliance or not. Have
5 you thought about how you're going to do that?

6 MR. SIEBER: A good question.

7 MR. GILL: I'm Paul Gill from Electrical
8 Engineering Branch.

9 As a matter of fact, what you alluded to
10 is one of the comments that we received, and in our
11 response and in what we are trying to say is that
12 there is, in essence, no regulatory basis for
13 requiring these. However, this type of information is
14 needed, and we need to know from the nuclear power
15 plants as to who's using it, how often they're
16 updating it so that we can look at that information
17 and come up with a recommendation in terms of staff if
18 we do need to go there to make a requirement.

19 So at this point I think it's premature to
20 say that, you know, we have a specific criteria as to
21 what is going to be acceptable. What we are trying to
22 do is to collect information through this generic
23 letter so that we can put our arms around it and look
24 at the overall industry and see what is the best
25 avenue to deal with this issue.

1 CHAIRPERSON WALLIS: You're talking about
2 a research investigation rather than a regulatory one.

3 MR. GILL: Well, I wouldn't say that, but
4 I think it's the practical information that we need to
5 know. We know there are entities that are using these
6 programs. They're updating five minutes, 15 minutes
7 or even sooner.

8 The question is, you know, what are these
9 programs and what information are they providing, and
10 what do we need in order to determine the
11 functionality of the off-site power system.

12 The real key issue here is: is the off-
13 site system functional? And all of the regulatory
14 requirements, these are embodied in the tech. spec.,
15 which then refers to the operability. So at this
16 point, I don't think either the licensees or we have
17 a real sense of determining whether that off-site
18 system is operable or not.

19 And there have been events that have
20 indicated to us that just looking at the meter does
21 not tell you the system is going to be operable if a
22 unit trips.

23 Now, you have adequate off-site power when
24 the unit is at power. However, should the unit trip,
25 you need the off-site power system per the GDCs and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the regulations.

2 Now, the question is: how do you
3 determine that off-site system is going to be operable
4 given a unit trip? I don't think anybody can say that
5 it is going to be unless you basically rely on these
6 tools to tell you what's going to happen.

7 MR. SIEBER: And let me make a couple of
8 comments. In February of next year, FERC will have
9 finished its notice of proposed rulemaking process and
10 put rules in place establishing the ERO and the
11 standards. So if you were to send out this generic
12 letter next February, you may get different answers
13 than you will sending it out in December because
14 there's going to be more infrastructure there, more
15 organization and more knowledge.

16 Now, I guess I pondered that, and I said,
17 on the one hand, you know, that's a good idea to wait
18 a little bit until FERC does its job. On the other
19 hand, I got this SRM in my hand that says, "You do
20 your job by December 15th," and so I'm sort of torn,
21 and I'm trying to evaluate whether you're going to get
22 enough information and good enough information to tell
23 you something when the organization that will provide
24 these answers to licensees is not yet in place.

25 Some regional system operators do a really

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 good job right now. Some others do not.

2 MR. GILL: I think the main focus of our
3 questions is the licensee's part in this relationship,
4 in this interface, what the licensee knows and is aware
5 of versus the TSO. We're not directing questions
6 toward the TSO or any of the external organizations
7 that are involved in the grid, but there must be a
8 handshake between the two organizations in order for
9 there to be a proper functioning of the system.

10 Now, to get back to your question and
11 hopefully try to be a little bit more direct on it,
12 the answers back will inform the staff as to what
13 exactly is that relationship, and the reason we went
14 down to the level of detail is because when we talk
15 about emergency diesel generator relaxations of
16 allowable outage times, where we're going from three
17 days to 14 days, then the amount of time that this
18 method that they use to assess where they are is
19 important, whether they use the real time contingency
20 program or whether they use a bounding analysis.

21 We would like to know whether these
22 intervals, these updates are compatible with each
23 other.

24 And so I don't think we're -- this is my
25 personal opinion -- I don't think that we're going to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 be talking about five minutes versus an hour on an
2 update, but you know, if there are days or weeks or
3 months in these updates, then that might be an area
4 for us to explore.

5 MR. SIEBER: Of course, it's sort of an
6 unusual thing just from the standpoint of the nuclear
7 plant operator. If the system operator says, you
8 know, "My contingency program says that we're sort of
9 on the edge," and the plant operator says, "I think
10 the off-site system is inoperable," my tech. specs.
11 say shut down.

12 If it wasn't messed up before, it will be
13 after he shuts down, you know. So it's not clear that
14 everything really works together here.

15 MR. GILL: Well, there is a time period
16 before he shuts down

17 MR. SIEBER: Yeah, I know.

18 MR. GILL: Twenty-four hours or 72 hours,
19 and as a matter of fact, I've read some event
20 notifications where they exactly did that. They went
21 in to declare it inoperable and then came back when
22 the voltages were restored. So there are some plants
23 that are actually doing what the generic letter is
24 seeking information on. They're already ahead of us,
25 but then there are others that --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. JENKINS: We don't have any
2 information on.

3 MR. GILL: Right.

4 MR. SIEBER: The interesting thing will be
5 for you to tell us what the answers were to all of the
6 questions that you're asking.

7 MR. GILL: We will provide you the
8 answers.

9 MR. SIEBER: Okay. Thanks.

10 I think we ought to give you a chance to
11 go on with your presentation.

12 MR. GILL: Okay. Well, again, I'm Paul
13 Gill.

14 I have the task of looking at the industry
15 comments, and as you mentioned, there's a whole lot of
16 them. In essence, they were from various nuclear
17 power utilities, owners groups, and organizations that
18 represent given nuclear power plants, and the Nuclear
19 Energy Institute.

20 We received also a comment from Oak Ridge
21 National Laboratory, State of New Jersey, and the
22 Bonneville Power Administration, as well as from an
23 individual via an E-mail.

24 MR. SIEBER: I would point out that
25 Bonneville is a TSO located in the northwest if the

1 country.

2 MR. GILL: Right.

3 MR. SIEBER: And it has probably got six
4 investor owned utilities and a whole bunch of
5 cooperatives and government-type utilities, and they
6 cover, you know, five or six states.

7 MR. GILL: And I guess the copies that we
8 furnished to you list all of the various entities that
9 made these comments.

10 MR. SIEBER: Yeah, and everything they
11 said, yeah.

12 MR. GILL: And, again, these comments were
13 in the areas essentially -- if you look at the generic
14 letter, we are seeking information in three areas.
15 One deals with the GDC-17 area and the tech. specs.
16 How do you meet the tech. spec. operability
17 requirements, and not necessarily how you meet GDC-17,
18 but the operability aspect or the functional aspect of
19 the GDC-17.

20 Now, GDC-17, as well as if you look at
21 some of the other GDCs, for example, I believe, 33,
22 34, 35, 38, 45 and 41, have very specific requirements
23 for an off-site power system to be operable, and it
24 says you have to have an on-site system as well as
25 off-site system. Assuming one is not available, the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 other should be.

2 So if you read those, it seems to me that
3 there is an operability or a functional requirement
4 that this system has to be operable or functional.

5 And then, of course, you know, those are
6 imbedded in the tech. specs. and embodied in the tech.
7 spec. to tell you what the operability requirements
8 are.

9 And similarly, as you mentioned earlier,
10 that 50.65 requires a risk assessment before you take
11 risk significant equipment out, and as well as station
12 blackout area, where the station blackout where the
13 station blackout, for example, has a requirement in
14 our Regulatory Guide 1.155, as well as the Numarc 8700
15 document, which was used as a basis for complying with
16 the station blackout rule.

17 Both of these documents have very specific
18 requirements for having procedures for restoring off-
19 site power and having these procedures, you know, to
20 bring power from other sources around the plant, and
21 so the question that we are seeking is to since now
22 the utilities are deregulated, we are asking the
23 nuclear power plant operators in the area how have you
24 handled that. You know, tell us about, you know, what
25 have you implemented.

1 Because your old load dispatcher through
2 which you had access to the outside system is no
3 longer part of that organization. Now you're speaking
4 with a TSO or ISO or RC and RA. These are all
5 different entities that control the grid. Now, tell
6 us about what kind of arrangements have you made.

7 So we are asking information. We are not
8 telling what to do, but at this point we are reaching
9 out and saying tell us, you know, what have you
10 implemented.

11 And similarly, also station blackout.
12 When we through implementing that rule in terms of
13 determining the coping duration, there was a very
14 specific requirement that looked at the experience of
15 the off-site system in terms of an interval given 20
16 years. It looked at the operating experience over a
17 20-year period and say, "How reliable was your grid
18 related to grid related failures?"

19 You know there are all kinds of failures
20 that you could lose your off-site power, but one of
21 the criteria which took into consideration how often
22 you had a failure that was related to the grid itself,
23 and based on that, your coping duration was
24 determined.

25 So now, given that we had a number of

1 failures as well as, you know, looking at a station
2 blackout rule in view of the August 14th, 2003, how
3 does that impact that assumption?

4 So we want to validate that assumption.
5 Indeed, it is still, you know, valid because it is a
6 living rule, and we need to. So we are asking
7 information on that.

8 So we divided these comments that we
9 received from the industry into those three major
10 categories, and then there was a comment on schedule,
11 which we then adjusted according to that. There were
12 some questions about backfit and legality of what we
13 were asking in our response in conjunction with our
14 legal office. We provided a legal response to that,
15 and there were comments that we couldn't bend into
16 these categories. So we called them miscellaneous
17 comments because there was an overlap.

18 Some questions basically addressed all of
19 these areas in common. So it was very hard to, you
20 know, sort it out. So we said, you know, these
21 miscellaneous comments, and I'll go over some of the
22 highlights of these comments.

23 Now, I made mention that you mentioned in
24 terms of these eight questions that we mentioned, four
25 in the GDC-17 area, two in the maintenance rule, and

1 two in the station blackout area, we mentioned that
2 they had subparts. If you look at the draft generic
3 letter that went out, we had not broken them into
4 subparts. They were just general questions.

5 And one of the comments that we received
6 way, "Hey, this is too cumbersome. It would be better
7 if you break them down into, you know, specific
8 questions," which you know, we took that and thought
9 that was a good idea. So we have now broken each
10 question into subparts, and many of these subparts are
11 yes/no answers. Okay? They're not very long.

12 We're asking are you doing this, and the
13 answer could be yes or no, you know. So they're
14 really -- what I want to say is they're not as long or
15 as big as one might think. There are some very simple
16 answers to these questions.

17 Next slide.

18 Now, since GDC-17 is the one with four
19 questions, we received most comments in that area, and
20 the gist of the comments that we received was
21 essentially saying the formal agreements between the
22 nuclear power plant and the TSO are not needed or not
23 essential, not required. Use of the RTCA, which is
24 the real time contingency analysis, is not required or
25 needed.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 And then GDC-17 is a design requirement.
2 It's not an operational requirement, and I think we
3 talked a little bit about that, and I might dwell on
4 that a little more on it as we go along.

5 Also, there was a comment saying plants
6 that are not designed to GDC-17, you know, how do we
7 handle that. They're not, you know, required to
8 address that.

9 And, you know, I will talk about that. If
10 you'll look at the plant, you know, FSER, USFAR and
11 you find that all plants have a criteria to which they
12 were licensed, it may not be GDC-17. It is probably
13 a plant specific design criteria, such as the old, you
14 know, Atomic Energy Commission safety criteria.

15 And you'll find that each plant has a
16 requirement for off-site/on-site power, very similar
17 to GDC-17.

18 So what we did is in the generic letter,
19 we made that, you know, change and said if you're not
20 designing for the GDC-17, then use what your licensing
21 basis is, and also the comments in terms of the
22 operability determination should not be based on
23 contingency analysis or "what if" models. We talked
24 a little bit about that.

25 Next slide, please.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 And, again, as we already have stated,
2 that the purpose of the generic letter is to go out
3 and get information so we can better understand what
4 each nuclear power plant, you know, is doing in terms
5 of this handshake with the TSO or their transmission
6 system operator, so that we can understand what
7 communication exists.

8 How do they, you know, let each other know
9 that, you know, there is a great distressed condition.
10 Does the plant know before you take some equipment
11 out, risk significant equipment out?

12 So the generic letter, in essence, is
13 asking or seeking information in those areas, and in
14 terms of the GDC-17, not implying operational
15 requirements and we disagreed with that comment
16 because if you read not only GDC-17, and I mentioned
17 these other GDCs, you know. There are a number of
18 them, such as mentioned 33, 34, through all the way up
19 to 41 or 48. They have very specific requirements for
20 the off-site power system to be available, given that
21 on site is not available. It says that you have to
22 assume on site it not available. This system should
23 be available to perform the safety function.

24 And those are embodied in the tech. spec.
25 Tech. specs. have specific requirements in terms of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 this off-site power, not only in terms of number of
2 lines, but as well as in terms of now we have the
3 degraded grid voltage set points, which tells you that
4 you have to maintain a voltage at those levels in
5 order for the safety equipment to be operable.

6 And if you don't have that level of
7 voltage, those relays are going to disengage you from
8 the off-site system and take you over to the on-site
9 system, given that the on-site system is available.

10 So when you look at all of these
11 requirements, it seems to me, at least in my humble
12 opinion, that there is a very definitive requirement
13 for the off-site system to be functional.

14 Now, the question is: how do you
15 determine is it functional given the greatest stress?

16 Now, the nuclear power plant operator
17 can't sit in a vacuum and say, "I'm looking at the
18 meter and I have the right voltage." Indeed, when the
19 unit is at hover, it's supporting that voltage.

20 Now, should you have a unit trip, you're
21 going to lose that support that is providing to the
22 grid, and your voltages are going to go down. It
23 means that you are not going to have a functional off-
24 site system.

25 So this is a key issue that we're trying

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 to get our arms around in terms of how does the plant
2 operator determine, given that you are in a stress
3 condition, that the off-site system is going to be
4 functional?

5 MR. SIEBER: Yes, this was a question in
6 the 1970s and '80s, and a lot of nuclear power plant
7 operators installed things like tap changing
8 transformers, capacitor banks, et cetera, so that they
9 could withstand the loss of their own unit or adjacent
10 units and still maintain proper voltage.

11 I remember those campaigns pretty
12 distinctly because we had to do a number of things
13 ourselves, and it seemed to me at the end of that that
14 sufficient steps had been taken by the industry so
15 that unless off-site power completely disappeared or
16 was extremely degraded and unstable, that the plants
17 could withstand their own trip or the trip of adjacent
18 units without losing or going below minimum voltage or
19 frequency where you would end up tripping off your own
20 emergency equipment.

21 MR. JENKINS: Things have changed, and
22 that's really kind of where we're coming from on this,
23 is that if you look at Diablo Canyon, for example, in
24 the FSAR, they refer to the support from Morro Bay,
25 another generating station, as being part of their

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 need to have off-site power; that that unit generating
2 provides them with support to maintain off-site power.

3 And part of the deregulation associated
4 with Morro Bay being sold off and the whole
5 restructuring in the California system, they had to
6 make a number of changes in the way their system was
7 set up, but things are --

8 MR. SIEBER: But those are basically
9 design issues. You know, you're supposed to foresee
10 all of this stuff, but inoperability determination,
11 you know, you sit there right now and you look at your
12 meters, and the voltage is okay, and you know that you
13 have given your switchyard conditions the ability to
14 cope with the loss of your own unit.

15 But then you're supposed to determine
16 operability by somehow looking into the future with a
17 real time contingency plan and deciding on the basis
18 of the probability whether you're going to be operable
19 five minutes from now or two hours from now or two
20 days from now, and that's pretty tough.

21 MR. JENKINS: Just to clarify, the real
22 time contingency analysis program looks at basically
23 a "what if" generating machine, which is that if I
24 lose this transmission line, will I have sufficient
25 voltage.

1 MR. SIEBER: This power plant or whatever.

2 MR. JENKINS: If I lose this generating
3 unit over here will i have sufficient voltage?

4 MR. SIEBER: Right.

5 MR. JENKINS: So, you know, it doesn't
6 really determine probability so much as a contingency.
7 Looking at that first contingency, can the system
8 survive the contingency and still provide adequate
9 voltage?

10 MR. GILL: And if I may add to that, when
11 we look at, you know, the design criteria, if you go
12 into the SRP, I mean, there's a whole list of this
13 contingency type things that are required when we
14 license the plant to have them assure that it's going
15 to work.

16 So it's not as if this is something new
17 that we're throwing on the table. This was always
18 there. The plant is designed, licensed to that so
19 that it should be able to withstand a loss of critical
20 transmission line or unit trip or a large, you know,
21 load or a generator.

22 Now, the only difference between then and
23 now is that then was one entity. So there was
24 confidence that they were going to operate in a manner
25 that was consistent in the best interest.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Now, you have a different entity that has
2 a different interest, and the question now is: does
3 the plant know what's going on on the bridge? Is
4 there a good communication interface that tells them,
5 okay, things are happening? We're in a stress
6 condition. You shouldn't be taking, you know, certain
7 equipment out, such as an emergency diesel generator,
8 for example.

9 MR. SIEBER: I think it's even more than
10 the fact that we have now decentralized organizations
11 and created generating companies and merchant power
12 plants and all of that. But the biggest effect is
13 that the infrastructure, transmission line,
14 substations, generating units versus the load demand,
15 the margins are getting smaller and smaller because
16 there isn't enough cash flow into the infrastructure
17 to expand it to meet the need.

18 And nothing that anybody is doing right
19 now really deals with that situation, and that to me
20 is a root cause.

21 MR. JENKINS: Yes, just another
22 clarification. We certainly don't want to give an
23 impression that all of the U.S. is deregulated, and
24 you have a mix. Some utilities are still vertically
25 integrated, but they are all under FERC Order 888,

1 which requires that they operate as if they were
2 deregulated.

3 MR. SIEBER: Okay.

4 MR. GILL: Next slide, please.

5 MR. SIEBER: Yeah, let's see if we can
6 hustle.

7 MR. GILL: To basically summarize, we
8 looked at the comments. We evaluated them, and as a
9 result of that, as you can see from the hard copies of
10 the GL that you have received, there's a lot of
11 strikeouts, and we have made a lot of changes to
12 accommodate the comments, and we defined the TSO terms
13 and the protocols.

14 We are saying that they are not required
15 per se, but you need to have that information and tell
16 us how are you getting that information and what kind
17 of information are you getting.

18 So we have, yo know, modified or changed
19 the generic letter in the spirit of the comments that
20 we received.

21 And also in the maintenance rule area,
22 where some of the comments were in terms of seasonal
23 variations, we are saying that per se they are not
24 required, but tell you, you know, have they occurred,
25 and if they have occurred what impact they had.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 So the GL, you know, has been revised to
2 reflect these comments. And similarly, in the station
3 blackout area that we have, essentially, you know,
4 explain the reasons why you're asking for that
5 information and what's the basis for it.

6 So as you can see, we have made
7 substantial changes in the generic letter, but still,
8 you know, the gist of this whole thing is trying to
9 seek the information so we can better understand
10 what's going on and, therefore, come up with
11 recommendations to the Commission in case we do need
12 to go to new rulemaking or whatever we need to do.

13 And also in the Mendez rule area, we have
14 defined what we call the grid risk sensitive equipment
15 in terms of that equipment that is sensitive to, you
16 know, or may cause grid risk. So you'll see that
17 being elaborated more in the GL.

18 Next slide, please.

19 And also in the GL we have added a sub-
20 question or a line item about training. The SRM that
21 was issued on May 19, 2005 requested that the staff
22 review training and examination programs in this area.
23 That is the area between the NPP operator and the grid
24 operator in terms of the training aspects that are,
25 you know, involved there, and also based on the RTI

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 finding and follow-up on that, we found there were at
2 least in one instance that I know inadequate
3 corrective actions associated with the training.

4 So we felt prudent that we should add a
5 line item to Questions 1, 3, 4, 6 and 7 that deal with
6 procedures in this area, that we need to get from the
7 licensees or the nuclear plant operators. You know,
8 how are they handling this training of their operators
9 in this area?

10 MR. JENKINS: At this time we'll have Bill
11 Raughley come up and he's going to give his short
12 presentation.

13 CHAIRPERSON WALLIS: Okay.

14 MR. RAUGHLEY: Bill Raughley from the
15 Office of Regulatory Research.

16 I was asked to give a brief presentation
17 on the work us and NRR are going with NERC and FERC,
18 and I'll provide you with the summary purpose and some
19 of the uses of the information.

20 Next slide, please.

21 From past presentations, you may recall
22 the Commission endorsed SECY 99-129 recommendations to
23 work with the electric industry and recently
24 encouraged MOAs with NERC and FERC, which RES and NRR
25 teamed to put in place. NRR got us started on this

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 task as part of the agency grid test action plan.
2 They asked us to obtain and analyze grid operational
3 data and look for some indicators of grid health.

4 And as we got into this, you really can't
5 drill down unless you have a model of the grid and the
6 nuclear power plants. And recognizing that the NPPs
7 are connected to the grid and subject to the same
8 condition, this effort is to better understand the
9 grid or the preferred power supply and provide a basis
10 to attack the problem from an engineering perspective.

11 So we look in that. We're working
12 quantitatively with the electric industry and
13 experienced electrical engineers to include the
14 nuclear plant loads, particularly following the trip
15 and the trip with the accident that we've been talking
16 about, the TSO limits, the NPP, the greater voltage
17 set points and for the PWRs, the under frequency set
18 points in the grid models.

19 And that will be the first pass. The
20 second pass NERC may want us to include more about the
21 control logic bus transfer timing.

22 In doing so, we're going to be treating
23 the grid as a finite supply, not an infinite supply.
24 That's largely different from how the nuclear plant
25 does their analysis.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Next slide, please.

2 What Nerc does is they do wide area,
3 regional, interregional power flow, which are load and
4 voltage studies and dynamic analysis, such as
5 transient dynamic stability studies, and these get
6 rolled up into summer, annual, ten-year reliability
7 studies, and they're very broad studies, and they're
8 looking at the future. Everything the NRC has been
9 doing we've been looking at the past and they're
10 trying to look ahead.

11 This is in contrast to the TSOs who are
12 doing in depth studies for their area.

13 The basic idea is that once the nuclear
14 power plants are modeled in sufficient detail, the
15 NERC studies will provide regular screening assessment
16 of the NPP and the grid conditions, and these
17 screening analyses provide a test of the capability
18 and reliability of the off-site power system to insure
19 its availability.

20 And I listed a few of the items here that
21 we can get feedback on from the NERC studies. They
22 have a whole list of things that they get from these
23 things as they're doing it.

24 In particular, the last bullet, you know,
25 as these studies are done and the models are passed

1 around, there's going to be an increased level of
2 awareness from the transmission systems and the
3 operators about the nuclear power plant constraints
4 and the critical points that need to be monitored
5 effectively.

6 One thing NERC wanted to do in the study
7 was that some plants have local voltage control, such
8 as tap changers, but most of them don't. So that
9 basically what you see is what you get, and the actual
10 voltage adjustment comes from someplace else in the
11 grid, and they want to understand where those critical
12 points are and that NERC has an effort internally to
13 identify significantly operational circuits. The flow
14 gates or nodes in the bridge that you've got to
15 control or have available the most --

16 MR. SIEBER: Well, the system operator --

17 MR. RAUGHLEY: -- to help control the
18 grid.

19 MR. SIEBER: -- one of his major
20 responsibilities is to adjust the voltages to keep
21 reactive power at a level that you don't burn the
22 lines down and trip out transmission lines or
23 substation breakers.

24 So the voltage that he may require on
25 different generating units may be different than what

1 would be the optimum voltage for a nuclear power plant
2 sitting on that same grid.

3 So I guess all I'm saying is it's not that
4 easy a problem.

5 MR. RAUGHLEY: No, no, and you've got to
6 work it out on paper ahead of time. It all gets into
7 understanding the grid is a function of how much
8 analysis you do to understand how it's going to behave
9 under different conditions, and once you understand
10 the conditions that are adverse, you stay away from
11 them.

12 MR. SIEBER: Right.

13 MR. RAUGHLEY: The last slide.

14 Some of the benefits of this is this is a
15 way to study and predict and monitor grid health.
16 It's a way to capture and assess all of the changes
17 going on. About this time last year I talked to you
18 about changes in the transmission loading. We saw the
19 relief requests mounting. You would be able to study
20 a Calloway type event.

21 We've got the summertime phenomenon with
22 the more effect of the grid on the nuclear power
23 plants in the summer, and we've got the overall
24 frequency of a loop decreasing, but importantly the
25 NRC studies show that the probability of a loop giving

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 a reactor trip is increasing, that that's caught
2 NERC's attention, and they're interested in where, and
3 this allows to investigate why.

4 FERC, as part of their new routine,
5 they've required the reporting of different planning,
6 bounding, planning and operational studies, and they
7 recently made us aware that some nuclear generators
8 are operating at very low power factors. So that
9 would be a very high bar, low megawatt to boost the
10 voltage in the area.

11 Under those conditions you might get a
12 different voltage. You get more of a voltage drop
13 following the reactor trip than you would at a higher
14 or normal power factor, but at the same time it
15 provides for a more stable system.

16 The other end of the spectrum you'd want
17 to investigate where you have the reactor power up
18 rates, where we're operating the reactors at a higher
19 power factor, which is a lower VAR supply to the
20 system, and under those conditions you'd get less of
21 a voltage drop, but that tends to destabilize the
22 system.

23 MR. SIEBER: Yeah, generally though the
24 nukes have a lower fuel cost. So they try to get as
25 much horsepower into it, which is real megawatts as

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 opposed to VARs.

2 MR. RAUGHLEY: So just to give us a way to
3 plug what's going on into and get some understanding
4 of whether the stuff is truly random or whether it can
5 be explained.

6 MR. SIEBER: Right.

7 MR. RAUGHLEY: We'll get other insights
8 where we could substantially reduce the impact of the
9 grid on the NRPs.

10 Another thing we're doing is identifying
11 grid and nuclear plant group behavior, signatures and
12 patterns under normal and less than ideal conditions.
13 For example, we've gone through and looked at the loop
14 history from 1965. Forty percent of the plants have
15 never had a loop at power or shutdown. So you get
16 into what's going on here. You know, you have the
17 Morro Bay. There might be some where you have
18 multiple units connected to a common switchyard, where
19 Morro Bay was -- every time a unit would trip there,
20 you'd get a momentary loop at the Aldo (phonetic), and
21 they made some fairly significant changes in grid
22 operation and in the plant design to work around that.
23 so there are some lessons learned there.

24 So I think this provides a platform to
25 really start to investigate things electrically.

1 MR. SIEBER: Okay.

2 MR. RAUGHLEY: And we're just getting
3 started on it. It will probably be the better part of
4 a year and a half, two years to get all of this stuff
5 plugged in if you're doing it in steps.

6 MR. SIEBER: I think one to two years, if
7 you can do it in that amount of time, you will be
8 lucky. You know, it's very complex and it's a lot of
9 work.

10 MR. RAUGHLEY: Okay. If there are any
11 questions.

12 DR. KRESS: I didn't see anywhere in the
13 generic letter -- maybe I missed it -- a good
14 definition of what's meant by grid risk sensitive.
15 Could you expand on that just a little for me?

16 MR. RAUGHLEY: That was, I guess, Slide --
17 we added that term to clarify in the maintenance rule
18 area. This is Slide 14.

19 DR. KRESS: Slide 14?

20 MR. RAUGHLEY: Yes.

21 DR. KRESS: Yeah, I saw that, but --

22 MR. RAUGHLEY: In response to the comments
23 to try to clarify what exactly are we concerned about
24 when you're talking about maintenance of risk
25 significant components, those that can cause a plant

1 trip, those that can cause a loss of off-site power or
2 loop, the equipment that can affect the ability to
3 deal with a station blackout.

4 DR. KRESS: But did you define these
5 terms, "high likelihood"?

6 MR. RAUGHLEY: No, we didn't define them.

7 DR. KRESS: Just leaving that up to the
8 operator to decide?

9 MR. RAUGHLEY: Well, you have PRA studies
10 that have been done, and certainly if you're talking
11 about the configuration risk management programs that
12 exist in many plants, they already know what equipment
13 is risk significant, and per the implementation of
14 maintenance rule, that's also part of something. They
15 would define what risk significant means for that
16 plant.

17 DR. KRESS: Normally they just assume the
18 normal frequency of a loop in deciding risk
19 significance of the things that they have got in
20 maintenance. So now you're asking them to do a
21 conditional given the loss of off-site power?

22 MR. RAUGHLEY: I think there's a
23 maintenance rule that's saying that before you enter
24 into an evolution that you look at the risk before
25 taking that equipment, risk significant equipment out.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 DR. KRESS: Yes, I understand that. I
2 mean, it's already required by the maintenance rule.

3 MR. RAUGHLEY: Right, and what we're
4 asking is --

5 DR. KRESS: Are you asking for something
6 more here?

7 MR. RAUGHLEY: Well, what we're asking is
8 does your evaluation that you're doing include the
9 risk from the grid as part of what you normally would
10 do.

11 DR. KRESS: Oh, you think it might not?

12 MR. RAUGHLEY: Yeah, yeah. We think it
13 might not.

14 DR. KRESS: I would assume it did.

15 MR. SIEBER: Well, the grid risk goes up
16 and down as conditions change on the grid. When you
17 do a maintenance rule assessed with what the risk is,
18 you put in a single number for grid reliability, and
19 that's what they're saying. Don't do that anymore.
20 Put a better number in for grid reliability.

21 DR. KRESS: A real time number in?

22 MR. SIEBER: Yeah, something like a
23 prediction.

24 MR. JENKINS: Well, we're trying to
25 ascertain exactly what they're doing, and not pre --

1 DR. KRESS: You just want to know what
2 they're doing.

3 MR. RAUGHLEY: We just want to know what
4 they're doing, and we can assess what they're doing to
5 see if that creates a problem.

6 CHAIRPERSON WALLIS: Well, your difficulty
7 comes, as I've said before -- you can get all of these
8 answers. You're going to have a real task to figure
9 out how to make a decision based on all of this
10 tremendous multiplicity of answers you're going to
11 get.

12 MR. SIEBER: Well, you're going to get a
13 different answer for every power plant.

14 DR. DENNING: I'd like to ask a question
15 of where does it go from here then because as I look
16 at this, it certainly looks like an escalation in
17 requirements is implicit in the letter, and I think
18 that's one of the things clearly that is an industry
19 concern. It's not just you're asking question. There
20 are some statements made about the interpretation of
21 what your assessment of functionability means, and
22 those are different from historically what people have
23 interpreted that.

24 And certainly at the time that the GDC was
25 put into effect, there was no concept of NRTCA. So

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the question is where does this really lead to. Is it
2 a rulemaking eventually or is it just regulatory? I
3 don't understand where it goes, how it impacts back
4 then on the utility perhaps in changes in technical
5 specifications. So where does it go?

6 MR. JENKINS: Once we have the
7 information, we'll assess the information not only in
8 terms of based on the information we've gotten from
9 NERC, FERC, the temporary instructions. We'll also be
10 looking in terms of their licensing basis, and
11 obviously we can't make changes unless you go through
12 the backfit process or we talk about rulemaking.

13 And certainly we're not at that point now.
14 The implications you may be reading in there is that
15 this is staff's expectations of where we are in this
16 particular point in time. If you look at the FSAR,
17 Chapter 8, there were grid studies performed when they
18 were licensed. So this is not something that's new.
19 What we are saying is that there have been dramatic
20 changes with respect to that relationship between the
21 nuclear power plant and the transmission system
22 operator, and we're trying to understand exactly what
23 is going on.

24 And in each case, it may be a different
25 answer depending on that licensee. We certainly are

1 not going to make any changes that will make the
2 situation worse. So we're trying to understand what
3 exactly is going on and how going forward safety is
4 maintained.

5 So we're not in any sense trying to imply
6 that licensees adopt the interpretation in the generic
7 letter. In the regulatory information summary of
8 2004-05, we spelled out these same expectations that
9 you read in the generic letter. We said, okay, this
10 is, given this current environment, what we would
11 expect licensees to do with respect to the regulations
12 that exist now.

13 We could very well get answers back
14 saying, well, that's not our interpretation of the
15 requirement.

16 Jose.

17 MR. CALVO: Yes. I'm the former Branch
18 Chief of the Electrical Instrumentation and Control
19 Branch. So treat me with dignity.

20 You're asking a good question, and you're
21 right. It's a monumental task to analyze all of these
22 questions, all of these responses to these questions.

23 Twenty years ago when we accepted the
24 designs, it was based in achieving a reasonable
25 assurance that a combination of the off site with the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 on site, and we also thought that the off site was the
2 preferred power supply. The on site, this was used
3 there for back-up and only for back-up purpose.

4 So the focus, we want to be sure that that
5 focus is still there. We're in the 21st Century. The
6 electrical utility industry has deregulated not all
7 the places, mostly in the Northeast and the Midwest,
8 and we would just like to know is that reasonable
9 assurance still there.

10 It is the combination of the off site and
11 the on site, the on site being preferred, okay, and
12 that's what we're trying to determine.

13 Now, we end up doing nothing or we end up
14 going to rulemaking. I think things today the GDC can
15 be interpreted many ways. It has been confused, and
16 it is confused now because the staff wants it. I was
17 here when that thing was written. It was done that
18 way to provide the flexibility that the designer would
19 like to have when you implemented this on-site power
20 system.

21 Now we're getting into trouble with that
22 because now the grid is not being operated in the way
23 that is envisioned 20 years ago. Now we're in the
24 21st Century. Things are different, and all the staff
25 is trying to do is to find out how things are today.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Maybe the regulations have to be rewritten or maybe
2 nothing is to be done.

3 Maybe there's a degree of awareness that
4 the fact that we're getting involved with the thing is
5 fine. We've done level samplings, by going to
6 different plants through the TIs, and we find out that
7 although everybody understands, the right people
8 aren't now aware of it. Okay? So somebody in the
9 organization knows about the thing, but the operator
10 who is responsible on a day-to-day thing is not.

11 So all we're trying to do is collect
12 information. Everybody thinks the same thing you
13 think. (Unintelligible.) We're not there yet, and
14 we can't tell you what is going to happen. It is
15 going to be a monumental task. The staff is going to
16 have to evaluate all of the things up, come back and
17 talk to you buys and see how together, how we can move
18 ahead. That's what we're trying to do.

19 And I guess Raughley is giving you a
20 little touch of what is it for research, what we're
21 doing into the future. See, we're looking at the
22 pressure situation. He's looking into the long-term
23 situation. How do things -- by the time we decide
24 what we're going to do, hoping that we come together
25 in FERC, that they come up with something that will

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 help us towards.

2 You know, FERC is building an organization
3 over there, and it's not there quite yet, but the time
4 will come. All of these will come together, and
5 working together with the industry, working with FERC,
6 I think we can come out with an assurance, a
7 reasonable assurance, that in this new world of the
8 21st Century with electrical power, that, yes, the
9 nuclear power plants continue to be safe, and that's
10 what we're trying to do.

11 And I'm signing off for a former Branch
12 Chief.

13 (Laughter.)

14 MR. SIEBER: Well, do the members have any
15 additional questions they'd like to ask?

16 DR. POWERS: The whole thing has the aura
17 of a fishing expedition to it, and I can understand
18 this argument that says, gee, things have changed a
19 lot from when the FSAR was written. Now, of course,
20 there should be updates to that FSAR on a two-year
21 basis. So I'm not sure why it's so terribly out of
22 date.

23 But let me get to the heart of the
24 question, which is we're going to collect this
25 information together and try to understand what it all

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 means, and then you're going to decide on a course of
2 action. Surely you must have thought what your course
3 of action is at least for some of these anecdotal
4 situations which you know about.

5 Can you tell us about those?

6 MR. JENKINS: You mean situations we have
7 run into as far as --

8 DR. POWERS: Yeah, run into a few of them,
9 enough to elicit your interest in this whole area.

10 MR. JENKINS: Well, you know, the Calloway
11 1999 event in which the plant discovered that, in
12 fact, due to these power flows going across their area
13 they would have had inadequate voltages had the unit
14 tripped, and that was really the first time that we
15 really had evidence that these external conditions
16 were affecting a plant.

17 And we have had I guess we call it
18 observations from the TI, from the temporary
19 instruction, that have indicated that in some cases,
20 you know, operators may not be aware of what the
21 actual conditions are.

22 If you're talking about in the maintenance
23 rule, it's not clear whether there's a consistent
24 basis for using grid information. Those are the kinds
25 of things that we've been seeing as far as the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 temporary instruction.

2 There are a number of different kinds of
3 observations.

4 Tom.

5 MR. KOSHY: One other example is when --
6 this is Thomas Koshy from Electrical Engineering
7 Branch.

8 When there is significant work going on in
9 the switchyard, if the nuclear station is not aware of
10 what happens in the nearest switchyard, they will very
11 well be taking the emergency diesel generator out for
12 a 14-day maintenance.

13 So if this communication is not there,
14 usually the switchyard work is one of the leading
15 causes for multiple unit outage. In fact, we already
16 had those, and they were working in the switchyard.

17 So what we are saying is communicate with
18 this outside agency, which is now independent, under
19 a different organization, so that when there is a high
20 vulnerability for a plant to trip off, your on-site
21 sources are kept ready and not in maintenance outages
22 that you can reach out for.

23 So these are the kind of examples. You
24 know, this is actually what I discuss in a working
25 group where we heard currently there is no such

1 coordination work.

2 DR. POWERS: Well, I think I understand
3 what the concern is. What I'm asking about is what
4 are you going to do about it. I mean, I understand
5 you can collect all of this information, but I'm
6 asking you surely have thought what you're going to do
7 about it in some limiting cases.

8 MR. KOSHY: What we have now found out is
9 the TIs and the information that we have put out have
10 given enough reasons for the working group to discuss
11 the subject, and we have sensitized the industry.

12 But what we're also finding is some of
13 them are still reluctant to accept it as, you know,
14 something undecided and they don't want to do.

15 We have some very good, shining examples
16 from certain plants actually in the Chicago area when
17 the grid voltages is considered unavailable. They
18 have found a way that they can trip off one of the
19 service water pumps and thus the plant load will be
20 such that they can live with the voltage that is
21 available.

22 So industry is finding creative ways to
23 solve this problem, but what we have done so far has
24 helped to build the awareness in a way that they're
25 prepared to deal with it, and they interact with the

1 outside agency to just consider it foreign, and now
2 they have a working arrangement to share with each
3 other the vulnerabilities on either side and be
4 prepared to deal with it.

5 The bottom line is that from this
6 information we come to the conclusion that they're not
7 in compliance with the regulations, we'll take the
8 appropriate action based on that.

9 We're nowhere near that point, but that
10 would be the offshoot of getting information in the
11 case that you have a safety issue. We will work
12 through that process to determine whether or not we
13 need to take any enforcement action.

14 MR. SIEBER: I don't want to limit
15 questions, but I sort of have to do that to give Mr.
16 Alex Marion from NEI an opportunity to say a few words
17 on behalf of the industry.

18 MR. MARION: Good morning. My name is
19 Alex Marion. I'm Senior Director of Engineering at
20 NEI.

21 I want to thank you for the opportunity to
22 make a few comments, and I do recognize I'm between
23 you and lunch. So I'll try to be as brief as I
24 possibly can.

25 On June 13th, NEI submitted comments on

1 the proposed generic letter on behalf of industry.
2 I'd like to ask. I'm assuming that you all have
3 reviewed those comments, and I'd like to take a minute
4 and ask if any of you have any questions about any
5 specific comments that we had submitted.

6 (No response.)

7 MR. MARION: Okay. We truly believe it is
8 appropriate for the NRC to request information, but
9 that information has to be bounded by information the
10 NRC needs to have to assess compliance with an
11 existing regulation, and that boundary condition is
12 established by the current plant licensing basis.

13 That's fundamentally the regulatory
14 framework, if you will, for requests for information.
15 More importantly, I found the discussion this morning
16 extremely interesting because the NRC is requesting
17 the information under the provisions of 10 CFR
18 50.54(f), which says NRC needs this information so
19 they could make a determination of what action needs
20 to be taken on the status of the operating license of
21 that facility.

22 I have yet to hear that there's a safety
23 concern. I have yet to hear that there is a direct,
24 straightforward compliance concern. So, therefore,
25 the whole concept that NRC is pursuing here, I think,

1 is questionable.

2 Extensive efforts have been taken within
3 the industry, and when I'm talking about the industry
4 in this context, it's the transmission industry as
5 well as the generation industry, as well as the supply
6 and distribution. A tremendous amount of efforts
7 involving FERC, Federal Energy Regulatory Commission,
8 and North American Electrical Liability Council, the
9 regional councils, the utility service commissions,
10 the utilities that are vertically aligned, the
11 entities that are responsible for transmission,
12 maintenance and operation, et cetera, to improve the
13 grid.

14 This has been reinforce with the energy
15 legislation that Dr. Sieber referred to that was
16 passed by Congress that establishes standards, and
17 those standards will be enforced, and they will be
18 complied with, and there are discussions right now
19 between NERC and FERC to determine the extent of
20 financial penalty that will be used.

21 The standards, by the way, are already in
22 place. They've been developed by NERC. They're
23 officially going to be enforceable with this action of
24 the notice of proposed rulemaking that was referred to
25 earlier.

1 The U.S.-Canada Power System Outage Task
2 Force that investigated the August 14th, 2003 event
3 was very clear in capturing the extent to which
4 nuclear power plants responded to the event. They
5 responded in a manner in which they were designed to
6 protect public health and safety. They also responded
7 in a manner consistent with NRC regulations.

8 Since that time we have been struggling on
9 behalf of the industry in trying to figure out what
10 problem the NRC is trying to solve. It's still not
11 clear. We do recognize that it's extremely important
12 for effective interaction and communication between
13 the nuclear plant owner-operators as generators and
14 the transmission service operators and other entities
15 that deal with the transmission side.

16 Efforts are underway to improve that
17 process. There's a NERC standard under development.
18 We referred to that in our comments. There has also
19 been action taken by INPO to make sure that that is
20 well established and in place, and efforts are
21 underway to do that.

22 I do want to make a couple of comments
23 relative to statements that were made in a briefing
24 this morning. There was a statement made by Mr.
25 Sieber relative to a utility taking a diesel out of

1 service in light of a hurricane approaching. Let me
2 give you some details on what happened there.

3 The plant had scheduled I think it was a
4 ten, 12-day maintenance outage on the diesel
5 generator. They began that outage the first day of
6 August. Okay? They completed that work or that
7 evolution, if you will, on the diesel, restored it
8 back into service about the 11th, 12th of August, some
9 time around there.

10 Hurricane Katrina didn't hit until the end
11 of the month. There's a two-week lag. So there have
12 been statements that have been made by NRC senior
13 management that a utility took a diesel out of service
14 as a hurricane was approaching landfall, and that is
15 absolutely unequivocally not true.

16 With regard to the maintenance rule, it's
17 very clear that the utilities have the responsibility
18 to assess and manage risk associated with maintenance.
19 There's no question about that.

20 What the NRC is doing at this particular
21 point is second guessing how the utilities are doing
22 that. In each of the cases that I'm aware of, the
23 case of Hurricane Katrina and that plant and the case
24 of San Onofre relative to the August 14th distribution
25 line outage, et cetera, the risk assessment evaluated

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the condition of the grid over that period of time.
2 It evaluated the susceptibility of having problems on
3 the grid that may affect the plant, and they did the
4 necessary risk analysis and the requirements of the
5 regulation and requirements of the threshold and reg.
6 guide -- not the requirements -- the guidance of the
7 threshold in Reg. Guide 1.74 were satisfied.

8 So the evaluations are being conducted.
9 The concern appears to be one of there's a perception
10 that the grid is more susceptible to disturbance in
11 the summer. We have yet to see data that validates
12 that.

13 At a public meeting last week with
14 Southern California Edison, representatives from the
15 California independent system operator as well as
16 representatives from Southern California Edison
17 organization responsible for the control center and
18 transmission operations indicated as well that they
19 haven't seen any data that suggests that to be the
20 case.

21 I was at the offices of the North American
22 Electric Liability Council yesterday, and I posed the
23 question to some of their staff. Their response was
24 that they haven't seen any data to indicate that's the
25 case.

1 If the NRC has any data, we would like to
2 engage them in a public meeting and let's resolve that
3 question once and for all.

4 I think it was Mr. Gill's presentation.
5 He suggested that there's a question of concern on the
6 part of the NRC associated with plants that exist or
7 that operate in a deregulated environment. I can
8 appreciate the concern, but we're not aware of any
9 data that indicates that there is a demonstrated
10 concern that there are different, unique problems for
11 generators in a regulated versus a deregulated
12 environment.

13 If the staff has such information, I would
14 ask them to make it publicly available.

15 Just one final comment regarding Mr.
16 Raughley's presentation on the Office of Research
17 activities. That's interesting stuff, looking at
18 transmission system operation analysis, power flows,
19 dynamic analyses and modeling of them.

20 The electric transmission utility industry
21 has been doing that for years. They will continue to
22 do that into the future. The question I pose is why
23 is NRC looking into that.

24 Those kinds of analyses have nothing to do
25 with regulating nuclear power plants, and with that,

1 that completes my comments, and I thank you for the
2 opportunity. I'll be more than happy to answer any
3 questions you may have.

4 DR. POWERS: Mr. Marion, I was struggling
5 with the same issue you opened with, with what is the
6 regulatory issue, and the perception I got out of the
7 presentations was that this was one of the -- the
8 concern was over the maintenance rule and whether
9 adequate risk planning was being done in carrying out
10 various kinds of maintenance, notably diesel
11 generators, but I got the impression there were other
12 things as well.

13 Is that your impression here?

14 MR. MARION: That's one of the concerns
15 that I understand or one of the areas that the NRC is
16 looking into, and it really gets down to what
17 considerations do you take into place when you do your
18 risk assessment as required by the maintenance rule.

19 And I have to tell you -- and I haven't
20 spoken with all of the utilities that have done these
21 assessments this summer, but a couple of the ones that
22 have been identified, for example, the plant that was
23 involved with Hurricane Katrina and the diesel, they
24 did their assessment. Their assessment was
25 independently validated by the region, and so we look

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 at that and say, "Well, what is the issue? What is it
2 that we need to make adjustments on? What do we need
3 to change?"

4 We're still struggling with that as an
5 industry, and individual plants are struggling with
6 that in terms of trying to understand NRC
7 expectations.

8 DR. POWERS: But I think the essential
9 point here is that these maintenance decisions do get
10 audited at least --

11 MR. MARION: Oh, absolutely.

12 DR. POWERS: -- and looked at very
13 carefully. So the question comes up: what are we
14 looking at more here?

15 MR. MARION: If I knew, I would tell you.
16 Really, we're struggling with this. We became
17 actively involved after the August 14th, 2003 event
18 and I'm proud to say that NERC has been involved,
19 North American Electric Liability Council and all of
20 the meetings we've had with an industry task force,
21 and one of the focus areas is try to understand what
22 the NRC concerns are so that we can be responsive to
23 those concerns and address them as best as we can.

24 And we are still going on to three years
25 later, still struggling with trying to identify the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 problem.

2 DR. DENNING: There's another element
3 here, Dana, that it seemed to me and that's related to
4 the RTCAs and whether plants are currently doing that
5 type of analysis and whether they are making decisions
6 that would require a shutdown of the plant based upon
7 those decisions.

8 Is that your interpretation as part of --

9 MR. SIEBER: That's going through the
10 analysis.

11 MR. MARION: As I understand it, and I
12 would ask the NRC to clarify my understanding, please,
13 the NRC expects the utility licensee responsible for
14 operation of the nuclear power plant to have
15 sufficient information relative to the output of these
16 real time contingency analyses. Okay?

17 The problem is that the utility owner-
18 operator is not responsible for any aspect of that
19 analysis. The transmission system operator is
20 responsible for that analysis. The transmission
21 system operator, when they identify a vulnerability
22 that may exist as a result of running the computer
23 model or doing a bounding analysis, they communicate
24 that information throughout the transmission industry
25 to the extent it affects the power plant.

1 They will communicate that to the nuclear
2 plants as well as the non-nuclear plants. So the
3 process is in place.

4 The question is how far do you take it,
5 and our argument is that the utility owner-operator
6 should be aware of the conditions on the grid. The
7 responsibility of communicating the information of the
8 conditions on the grid rest with the transmission
9 organization. All right? And as long as that
10 protocol is in place, the information is being
11 exchanged and appropriate action is being taken.

12 And at a public meeting last week with
13 Southern California Edison, I referred to earlier that
14 there was a representative from the California
15 independent system operator as well as the Southern
16 California Edison transmission organization, as well
17 as the plant, and they discussed the August 25th line
18 outage, August 24th. I forget the date, but some time
19 in August of this year, and they clearly demonstrated
20 the extent of communications and the actions that were
21 taken by each of those players involved in the
22 transmission operation, as well as the nuclear power
23 plant.

24 MR. JENKINS: In reference to that
25 meeting, the licensee requested that they come in and

1 talk to us to clarify exactly what went on, and when
2 we get their letter we'll certainly assess the actions
3 that were taken there.

4 Getting to your question, the use of
5 tools, state-of-the-art tools is not unusual to refer
6 to these tools when you're talking about how do you
7 arrive at a given assessment, and so the generic
8 letter does not require nuclear power plant operators
9 to use the tool.

10 MR. SIEBER: They can't.

11 MR. JENKINS: What we're trying to do is
12 to say, okay, are you aware of the use of these tools
13 and how not using these tools may, in fact, identify
14 whether or not the transmission system operator is
15 keeping the system updated properly that you are
16 relying on.

17 You're relying on the transmission system
18 operator to tell you that, in fact, All State Power is
19 operable, and if they are using an analysis that is
20 out of date or not current to actual conditions, then
21 you have a responsibility to be aware of that, to work
22 with the transmission system operator to make sure
23 that they have the best tools that's possible such
24 that if there is a situation that comes around where
25 the grid operations are outside the bounds of that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 analysis, you will be aware of it.

2 So it's more of an awareness. The purpose
3 of it is not to imply any requirements, but to talk
4 about awareness.

5 yes?

6 MR. SIEBER: And just to wind it up, but
7 at the same time I think I have to make a comment
8 here. It would appear that the nuclear power plant
9 operator is supposed to know what tools the
10 transmission system operator is using, whether they
11 are up to date, when the analysis is performed. I
12 think that really goes well beyond what the nuclear
13 plant operator is required to do.

14 MR. JENKINS: Jose.

15 MR. CALVO: Let me put it in perspective.
16 We said that we don't know what we ask in these
17 questions. There's no connection that could be made
18 that we needed the regulation.

19 Those tools, it's not the tools that are
20 important. We want to be sure that the operator knows
21 that he's meeting the regulations. Why are we
22 worrying about those tolls? Because the operator --
23 a nuclear power plant must meet the first contingency,
24 meaning that if I lost the nuclear power plant, okay,
25 I must have assurance that the availability of said

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 power would prevail. All right?

2 So that's the reason for those tools. So
3 how did the -- the operator is aware that the operator
4 is providing the right kind of information, and then
5 we're getting into the tools. Okay? We're trying to
6 verify based on where.

7 If you want to remember anything about the
8 grid, one thing that is immediately it continues to
9 meeting our regulations. How do we know that to be
10 the first contingency? It's by knowing that if the
11 tools are in place, then it assures them that the grid
12 is being managed in such a manner that if I lose that
13 local unit, okay, the GDC-17 says you minimize the
14 probability or loosen the capability of off-site power
15 to the emergency buses.

16 That's what we ask of those tools. We're
17 not there fishing on the grid. We were here at the
18 nuclear power plant worrying about safety, okay, and
19 we've got regulations in place, and I think Mr. Marion
20 here, Alex, is making a good point, making that he's
21 confused and we also are to confused. So we are
22 confused. What is wrong getting that information so
23 we can determine what is the next step to go in the
24 future so that we will get de-confused? Okay?

25 I think he is just making a point for us

1 in there.

2 MR. SIEBER: Well, sine we're all now in
3 agreement, I would point out that we have chores that
4 we have to do during lunch hour, and so our actual
5 time to eat is really disappearing.

6 So I would like to thank everyone for the
7 presentations and the effort that they went through,
8 and we will be sure to send you a letter.

9 Thank you very much. Mr. Chairman.

10 CHAIRPERSON WALLIS: Thank you.

11 Now, before we adjourn for lunch, we are
12 behind. We have interviews, and I would like to allow
13 the committee a chance to at least get a sandwich or
14 something. So we will not start the next session
15 until one o'clock.

16 (Whereupon, at 11:56 a.m., the meeting was
17 recessed for lunch, to reconvene at 1:00 p.m., the
18 same day.)

AFTERNOON SESSION

(1:03 p.m.)

CHAIRPERSON WALLIS: I'm looking forward to hearing about the ESBWR. My colleague Tom Kress will take over from me for that purpose.

Tom.

DR. KRESS: Thank you, Mr. Chairman.

This is just an information briefing for us. I think we'll learn more about the design and the safety features of the ESBWR. It's now very important for us to follow this because they have to come in with an application for certification. The staff has gone back and asked for more information, more details, but it's serious now, and we want to really take a look at it.

I think later on we'll have meetings on probably the PWR, probably the thermal hydraulic aspects of the Chapter 15 stuff, but we don't expect to have a letter. This is mostly for us to be sure we're up to speed on what the ESBWR design is and what kind of safety features and redundancy and diversity it has.

Those of you that like acid systems ought to really love this one.

CHAIRPERSON WALLIS: We've heard about

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 this before.

2 DR. KRESS: Yeah, we've had discussions on
3 it before, but now we've got to really think about it
4 because --

5 CHAIRPERSON WALLIS: Got some more detail
6 this time?

7 DR. KRESS: Yeah, more detail. We are
8 going to be faced with the certification, and so we
9 want to be sure we are up to speed again.

10 So with that I guess I'll turn it over to
11 Amy Cabbage of the staff to lead us on.

12 MS. CUBBAGE: Yes. Amy Cabbage. I'm a
13 Senior Project Manager in the New Reactor Licensing
14 Branch, and I'm a lead project manager on the ESBWR
15 design certification review.

16 Larry Rossbach is here. He's also one of
17 the project managers and we'll be adding to our team
18 very soon because the work is pretty heavy.

19 I just wanted to go over briefly. As you
20 mentioned, we've been here before to talk about the
21 ESBWR. In July '03 we briefed the Thermal Hydraulic
22 Subcommittee and again in January 2004 and then
23 February 2004 we went to the full committee and the
24 subject there was the Track G LOCA review, and we
25 received a letter from the ACRS in February 2004 and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 subsequently we issued a safety evaluation report
2 approving the application of Track G for ESBWR LOCA.

3 I just wanted to take a minute to go over
4 the project overview. We're doing things a little bit
5 differently this time rather than the way we did
6 things on AP-1000, and the key difference here is
7 rather than a DSER, we're issuing a safety valuation
8 report with open items, and that safety valuation
9 report will have more review finality that we have
10 previously so that when we go to the final stage,
11 rather than reissuing another 2,500 page document and
12 having to go through it all again from front to back,
13 we're going to address the open issues and
14 supplemental SERs, one or multiple depending on the
15 timing of the closure of the open issues.

16 I think this may impact our interaction
17 with you regarding when we would expect letters and to
18 be reaching closure on issues, our goal with this
19 review is to identify issues and resolve them as early
20 as possible, and so to that extent we hope that we can
21 get issues on the table that you may have as early as
22 possible in order to allow time to resolve them.

23 DR. KRESS: Well, we'd normally try to
24 write an interim letter when we have issues. I don't
25 know that this is the time yet, but --

1 MS. CUBBAGE: No, this would not be the
2 time, but I think what we're getting at is previously
3 with the DSER there was always the expectation that
4 everyone would get another bite at the apple, and in
5 this case we want to reach a level of finality with
6 that SER with open items, and hopefully address any
7 concerns that you may have at that time with the
8 issues that the staff has reached closure on, and then
9 move forward into more of a strictly open issue
10 resolution mode with the final.

11 CHAIRPERSON WALLIS: And what we've had so
12 far and it looks like what we're going to get today is
13 a lot of descriptive material, and some time we're
14 going to get some numbers, are we, and something --

15 MS. CUBBAGE: Well, you all should have
16 received a copy of the Rev. O application. That plus
17 the PRA is about 7,600 pages of information, and so
18 this is a short overview session here for the full
19 committee.

20 CHAIRPERSON WALLIS: But it points us at
21 places we should read in this huge piece of document?

22 MS. CUBBAGE: Well, I expect that we'll be
23 coming back for much more detailed sessions, and we're
24 already talking with your staff about a subcommittee
25 meeting on PRA severe accidents.

1 CHAIRPERSON WALLIS: But when we get these
2 enormous documents, it helps if someone can say,
3 "Well, these are the areas where you really should
4 focus" because that's where the issues are.

5 MS. CUBBAGE: Well, yeah. We're not quite
6 at the point where we can --

7 CHAIRPERSON WALLIS: Not at that point
8 yet?

9 MS. CUBBAGE: -- point you in that area.

10 And then I just wanted to point out to you
11 that the nominal duration for design certification
12 review, including rulemaking is 42 to 60 months. We
13 have not yet set a specific schedule for the ESBWR
14 review pending resolution of the acceptance review
15 issues.

16 So the application was submitted in late
17 August. We sent a letter in late September to GE
18 requesting more information before the staff could
19 formally accept the application for docketing. GE to
20 date has responded to all of those issues. They
21 provided several submittals including multiple topical
22 reports.

23 We're currently reviewing those submittals
24 for acceptance, and we expect to communicate the
25 results to GE by the end of this month.

1 And that's all I have. I'd like to
2 introduce David Hinds to make the presentation for GE.

3 DR. DENNING: Could I ask a question
4 before we move on to that?

5 MS. CUBBAGE: Sure.

6 DR. DENNING: And that is obviously in an
7 open meeting we can't talk about security related
8 elements.

9 MS. CUBBAGE: That's right.

10 DR. DENNING: But at some time I think we
11 would be very interested in that, and I'm particularly
12 curious about just the process at this point and how
13 much effort is spent and what the criteria are that
14 would be used in that review, and then I'm not sure
15 whether this belongs in Tom's subcommittee or Mario's
16 on security, but I guess I'm just curious.

17 MS. CUBBAGE: Right.

18 DR. DENNING: When would we get a chance
19 to see those types of considerations?

20 MS. CUBBAGE: We would anticipate having
21 interactions with you on those as we would with any
22 other of the issues in the application. To date they
23 have submitted a safeguard submittal that provides
24 some information about how their design complies with
25 existing requirements and the revised DBT and ICMS.

1 We've also issued a SECY paper recently,
2 SECY 05120, which is specifically related to new
3 reactor licensing security issues, and we have an
4 effort underway to begin defining what criteria we
5 would use in those areas.

6 So we're in a process there where we don't
7 have set criteria yet.

8 DR. DENNING: Thank you.

9 MS. CUBBAGE: Okay.

10 MR. HINDS: Okay. Good afternoon. I'm
11 David Hinds. I'm the General Electric engineering
12 manager for the ESBWR project, and I'm accompanied
13 here with Alan Beard and Rick Wachowiak on our team.

14 I'll be handing off during the
15 presentation to those gentlemen.

16 We have here today basically an overview,
17 no specific targeted segment of ESBWR, but came in
18 with an overview to give you, I guess, a first glimpse
19 of the ESBWR, an overview of the signed certification
20 status, which Amy has already given you a little bit
21 of information.

22 As far as go through a little bit of
23 design evolution of the BWR, the primary
24 characteristics, design improvements, a little bit of
25 detail of the passive safety systems, and then we have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 with Rick Wachowiak a discussion of the PRA.

2 Okay. The ESBWR basically builds on the
3 ABWR certified design. I currently have ABWR projects
4 overseas which the Lungman project currently in
5 progress. We have a team in place to support the
6 Lungman, using that experience base within GE to help
7 advance --

8 CHAIRPERSON WALLIS: Where is Lungman?

9 MR. HINDS: Lungman? That's in Taiwan.

10 CHAIRPERSON WALLIS: It's Taiwan?

11 MR. HINDS: Yes, sir. So using the
12 team --

13 DR. BONACA: And you're building an ABWR
14 in Taiwan?

15 MR. HINDS: Yes, in Lungman. That's
16 correct.

17 DR. SHACK: How many do you have operating
18 in Japan?

19 MR. HINDS: Let's see. I believe it's
20 three.

21 PARTICIPANT: Three in operation and two
22 under construction.

23 MR. HINDS: Okay. So anyway, using some
24 of the technology from ABWR and advancing it forward,
25 the passive safety systems are new. So we have built

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 on some experience there as far as our suppliers, as
2 far as our technology, and we plan to continue to move
3 that forward. ESBWR is the product where we're doing
4 that.

5 We submitted the DCD as I mentioned before
6 in August. It's using standard reg. guide format, and
7 it's also reliant upon I mentioned the technology of
8 the ABWR, but we also have technology from SBWR.

9 I've got a little slide coming up here
10 which will help. I give a little graphic of that.

11 We also have been watching the AP-1000
12 certification efforts in order to learn lessons from
13 the industry in that regard as well, in areas like,
14 for instance, main control room habitability, witness
15 to regulatory treatment of non-safety systems, diverse
16 digital C&I. We're learning from the industry as
17 well.

18 DR. KRESS: Is C&I the same thing as I&C?

19 MR. HINDS: It is.

20 (Laughter.)

21 MR. HINDS: I&C, C&I, sure, the same
22 thing. Control and instrumentation or instrumentation
23 and control.

24 The NRC initiated prompt review once we
25 submitted the DCD, and we've had a great deal of

1 communication and questions, and we have been
2 providing additional information for clarification as
3 well as additional technical submittals based upon
4 those interactions.

5 We have received an acceptance review
6 letter from the NRC that in identified areas requiring
7 further information and, as mentioned previously, we
8 have responded to that and provided additional
9 information.

10 We also came up and had a multi-day
11 session with the staff in order to give a
12 communication from our technical leads to the review
13 staff in order to provide detailed technical
14 information in a verbal setting and allow some
15 interaction in a question and answer to get the review
16 started.

17 This will just real briefly mention about
18 BWR evolution. The early BWR began in Dresden with
19 steam generators and steam drum there. Moving over to
20 the multi-loop steam generators with no steam drum,
21 and then on to the -- and you can see the Oyster Creek
22 there with the recirc. loops, and then moving into
23 Dresden with recirc. loops with jet pumps.

24 Then that evolved further into the ABWR,
25 which does not have recirc. loops, but does have

1 recirc. pumps there at the bottom head area.

2 Then the evolution where we currently are
3 is into the natural circulation, which began with the
4 SBWR. SBWR did not -- began the certification
5 process, but did not complete it. It was not
6 commercially feasible at the time based upon the
7 economics. So we withdrew that effort, and then
8 advanced that technology forward to the ESBWR, which
9 is similar but a larger reactor.

10 And just real briefly, on the containment
11 evolution, beginning in the early stages with the dry
12 containment, moving to the pressure suppression type
13 containment, then on to the Mark III style
14 containment. The containment has been also evolving
15 all the way up to the SBWR and ESBWR, which has
16 elevated suppression pools. You can see down at the
17 bottom portion of your slide elevated suppression
18 pools and then elevated GDCS tanks, which we'll give
19 you much more detail later on in the presentation as
20 far as the passive safety injection systems, which
21 take advantage of the height difference.

22 DR. KRESS: That's the spent fuel pool off
23 to the side there?

24 MR. HINDS: Yes, sir. Over in the ESBWR
25 that's the spent fuel pool down at grade elevation

1 there. So that was another change from SBWR to ESBWR,
2 is bringing the fuel pool down to grade elevation.

3 One of the other requirements -- yes, sir.

4 DR. KRESS: Is that line that goes around,
5 is that the containment, confinement? I mean, is the
6 spent fuel pool inside or outside the containment?

7 MR. HINDS: It's outside.

8 CHAIRPERSON WALLIS: It's outside. t Eh
9 containment is that heavier line inside.

10 DR. KRESS: It's the heavier line, yeah.

11 MR. HINDS: Right. Yes, heavier line and
12 then comes underneath the reactor vessel.

13 CHAIRPERSON WALLIS: I think it's that
14 dome above the reactor there, the little cap thing
15 above there.

16 DR. KRESS: Yes.

17 MR. HINDS: Yeah, containment --

18 CHAIRPERSON WALLIS: It's that thing,
19 right.

20 MR. HINDS: -- would be in this. This
21 would be our containment down there.

22 Okay. As far as EPRI produced the utility
23 requirements document, and just a real high level
24 overview indicating that we do meet those requirements
25 and then some, at least in these areas mentioned here.

1 The tornado, 330 miles per hour rating, extreme winds,
2 140, temperature bounds the ESP sites that we
3 currently have, and seismic meets the Reg. Guide 1.60
4 plus a central U.S. hard rock site.

5 CHAIRPERSON WALLIS: So we can't debate
6 these extreme winds. That's something someone has
7 already decided?

8 MR. HINDS: I'm sorry. I couldn't hear.

9 CHAIRPERSON WALLIS: There's one 40 miles
10 per hour that's already decided by somebody else.
11 It's not available.

12 MR. HINDS: That was what we incorporated
13 into the design.

14 CHAIRPERSON WALLIS: You did it or was it
15 required by the agency?

16 MR. HINDS: It was the EPRI utility
17 requirements document has a number. I believe it's
18 125, and we designed above that to 140. Alan, if you
19 know the exact number, you can.

20 MR. BEARD: One, twenty-two.

21 MR. HINDS: One, twenty-two? Okay.
22 That's what the EPRI requirement was when we designed
23 in excess of that, and that was the number that we
24 chose.

25 CHAIRPERSON WALLIS: But it's quite clear

1 that Category 5 hurricanes go above that.

2 But anyway, let's move on.

3 MR. HINDS: Yes, I understand.

4 Okay. This is not very easy on the eye,
5 but just to give you a --I've got another slide
6 that --

7 CHAIRPERSON WALLIS: It's impossible on
8 the eye.

9 MR. HINDS: This is just to show you a
10 little bit of the site layout of the standard
11 reference plan. Right in the center there would be
12 the reactor building.

13 The next slide has got a --

14 CHAIRPERSON WALLIS: That little thing is
15 the reactor building.

16 MR. HINDS: We didn't have the detail
17 slide, but reactor building with control building and
18 turbine building off in this direction, force cooling
19 towers if needed on the site, and we would adjust, if
20 necessary, if it's a multi-unit site.

21 Okay. Can everybody hear me now? All
22 right.

23 Okay. Here are some basic parameters of
24 the ESBWR. It's a 4,500 megawatt thermal power with
25 approximately 1,575 megawatts electric gross. Now, of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 course, I say approximately because that will be
2 dependent upon some site parameters in specific
3 turbine as well as cooling water capacity or cooling
4 water parameters.

5 It is a natural circulation plant. There
6 are no recirc. pumps, no recirc. loops, and there's
7 passive safety systems, which 72 hour passive
8 capability.

9 CHAIRPERSON WALLIS: Is this megawatts all
10 out of one turbine? You don't build a turbine that
11 big, do you?

12 MR. HINDS: We, GE, don't currently. They
13 are made in -- there is a manufacturer that makes them
14 that big, and there are efforts underway for other
15 manufacturers to make one that large, as well.

16 DR. KRESS: So you envision this would be
17 single loop?

18 MR. HINDS: Yeah, it's --

19 DR. KRESS: Going directly to the turbine.

20 MR. HINDS: That's correct. That's
21 correct.

22 And then I've got another slide on here
23 that shows the steam cycle. So I'll move on to that,
24 and that might help answer your question.

25 MR. SIEBER: Do you have active safety

1 systems?

2 MR. HINDS: No, sir, it's passive safety.
3 And we have some detailed slides in here that will
4 show you each system by system. So we'll show you
5 those, and this gives you --

6 DR. KRESS: But you have some active non-
7 safety systems, like the ABWR.

8 MR. HINDS: That's correct. We have
9 active, non-safety systems, but we don't have -- our
10 safety systems are passive.

11 CHAIRPERSON WALLIS: There's no back-up
12 that's active? I guess there is, but it's not called
13 safety. Isn't that really what it is, what it amounts
14 to? They're not classified as safety systems, but
15 there are things you can do to augment this.

16 MR. HINDS: There are things that can
17 improve the situation, but as far as the systems that
18 we credit for safety, they are passive.

19 CHAIRPERSON WALLIS: When you do your PRA,
20 you only count those ones?

21 MR. SIEBER: No.

22 CHAIRPERSON WALLIS: Or do you count the
23 other one, count the other ones that you could use in
24 the PRA?

25 MR. BEARD: We count both, and there's a

1 huge difference.

2 CHAIRPERSON WALLIS: A big difference,
3 right.

4 MS. CUBBAGE: It's the same approach as
5 with the AP-1000 passive plant design.

6 MR. HINDS: Yes, and Rick, if you have any
7 further comments on it. We do have some PRA slides in
8 the end, and we do have our PRA expert here. So I
9 didn't want to steal too much of his thunder, but,
10 yes, we credit passive safety systems, and Rick will
11 go through a little more detail in the PRA, if you can
12 hold for a minute on that.

13 Just an overview here of the plant. As
14 far as the passive safety systems, again, we'll give
15 you more details on them in just a minute in the
16 presentation, but there is a gravity driven cooling
17 system which Alan will be talking about in just a
18 minute.

19 Of course, the elevated suppression pools,
20 isolation condenser up in this area, and the passive
21 containment cooling system.

22 As far as the steam plant, you mentioned
23 or you asked about the steam plant. Here's the steam
24 line going to high pressure turbine with three low
25 pressure turbines.

1 So somewhat a standard steam plant. We do
2 -- our reference design is indicating three low
3 pressure turbines. A couple of differences is a
4 direct contact feedwater heater, a feed pump and
5 booster pump coupled together.

6 Other differences from past designs,
7 reactor water clean-up and shutdown cooling combined
8 into one non-safety system, and that might go a little
9 bit towards answering one of your questions a minute
10 ago.

11 Fuel in auxiliary pool cooling system
12 which has quite a number of functions here, moving
13 water as well as purification. Standby liquid control
14 which is also passive, which has a pressurized tank
15 here to inject our standby liquid control system.

16 And a control rod drive system similar to
17 past BWR designs, but there are some additional
18 features as far as injection capability, and that also
19 might answer a little bit of the question as to
20 injection capability. So that's another non-safety
21 system that we have the ability to inject with.

22 And standard hydraulic control units but
23 define motion control rod drives as opposed to past
24 BWRs. In this country at least, ABWR has used defined
25 motion control rod drive.

1 CHAIRPERSON WALLIS: Would you take your
2 laser and go around what you call containment in this
3 for us again so that we'll know exactly what that is?

4 MR. HINDS: Okay, all right. Let's see.

5 CHAIRPERSON WALLIS: Up there and around.
6 so it contains those pools, but it doesn't contain
7 those upper pools.

8 MR. HINDS: That's correct. It contains
9 the --

10 CHAIRPERSON WALLIS: So the condenser is
11 part of the containment system them. The condenser is
12 part of the --

13 MR. HINDS: If you're referring to the --
14 this is the passive containment cooling system,
15 isolation condenser.

16 CHAIRPERSON WALLIS: The condenser is part
17 of the retainer of fission products in the
18 containment.

19 MR. HINDS: These are not within
20 containment if that was your question.

21 CHAIRPERSON WALLIS: No, but they are part
22 of the circuit which sees any fission product. So
23 they must be --

24 MR. HINDS: Yes.

25 PARTICIPANT: Primary pressure.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. HINDS: Yes.

2 CHAIRPERSON WALLIS: Primary pressure
3 boundary, right.

4 MR. HINDS: Excuse me. I'm sorry.

5 DR. BONACA: This is your container.

6 MR. HINDS: Yes, that's correct, on the
7 cover of your --

8 CHAIRPERSON WALLIS: It's not just the
9 primary pressure boundary. It's the containment
10 boundary.

11 MR. HINDS: This is the isolation
12 condenser, and again we've got some slides that will
13 show more detail on it in a minute, but the isolation
14 condenser sees reactor pressure in this loop here, and
15 the passive containment cooling system sees
16 containment pressure through there.

17 CHAIRPERSON WALLIS: Yes, right. That's
18 what I mean. Right.

19 MR. HINDS: Okay. But the external side
20 here, meaning the pool, is not itself within
21 containment.

22 Okay. Here's some differences. This is
23 comparing ESBWR and ABWR, just to highlight a few.
24 I've already discussed several of them, but there are
25 no recirc systems. There's no recirc system. It's

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 natural circulation in the ESBWR.

2 On the ABWR we had a high pressure core
3 flooder system, low pressure flooder, and similar to
4 NRHR, similar to previous BWRs, which had high
5 pressure and low pressure systems and residual heat
6 removal.

7 We now have passive safety systems, and I
8 mentioned the non-safety reactor water clean-up
9 combined with the shutdown cooling system. We don't
10 have any safety grade diesel generators, and we don't
11 have RCIC. We have the isolation condenser serving a
12 similar function to what RCIC did in past plants.

13 CHAIRPERSON WALLIS: So everything is
14 passive except for long-term cooling you have to have
15 some sort of a circuit that takes heat out.

16 MR. HINDS: We have the combined reactor
17 water clean-up shutdown cooling system.

18 CHAIRPERSON WALLIS: Which is active.

19 MR. HINDS: That is active. That is
20 correct.

21 CHAIRPERSON WALLIS: It's not like the AP-
22 1000 where you have sort of an air cooled containment.

23 MR. HINDS: It is not like that, no.

24 CHAIRPERSON WALLIS: Not like that.

25 MR. HINDS: And the SLC, there are no

1 pumps. No pumps any longer in the SLC system. It's
2 basically a pressurized accumulator to inject the
3 standby liquid control system to handle the ATWS.

4 DR. POWERS: How is that not an
5 operational -- I mean, what's the accumulator set
6 point on it?

7 MR. HINDS: What's the pressure seen in
8 the accumulator? Let's see. Can you help me out
9 there, Alan?

10 MR. BEARD: Twenty-two hundred pounds.

11 MR. HINDS: Twenty-two hundred pounds. So
12 it's a pressurized accumulator.

13 CHAIRPERSON WALLIS: Pounds per square
14 inch.

15 DR. POWERS: It's not passively open. It
16 has to be actively opened?

17 MR. HINDS: It requires a valve to open.

18 MR. BEARD: Squib.

19 MR. HINDS: Squib valve.

20 Here's a couple other -- highlighting some
21 other differences with some numbers here. The power
22 mentioned on the previous slide, 4,500 megawatts
23 thermal, about 1,575 electric.

24 The reactor vessel is -- I'm sorry? Okay,
25 okay.

1 PARTICIPANT: I'm converting meters to
2 feet in my head.

3 MR. HINDS: Yes. The reactor vessel is
4 similar in diameter to or the same in diameter to the
5 ABWR, but it's a taller vessel, and we have a picture
6 of it here in the later slides.

7 Fuel bundles, more fuel bundles. There's
8 1,132 fuel bundles.

9 DR. POWERS: Huge.

10 MR. HINDS: With it, three meter active
11 fuel height, and the no recirc loops I've mentioned a
12 couple of times.

13 Control rod drives, of course, more
14 control rod drives with that size of the core, 269
15 fine motion control rod drives, and we've already
16 talked about the lack of safety system pumps.

17 And just a quick preview. Again, we have
18 more detailed slides on PRA, but there's a PRA number,
19 3E minus 8.

20 DR. POWERS: I'd just love to see the
21 trade study that occurred on this core design.

22 MR. HINDS: Love?

23 DR. POWERS: Love to see the trade study
24 on this core design. That would be really
25 interesting. Not important.

1 MR. HINDS: Okay.

2 DR. POWERS: But certainly curious.

3 MR. HINDS: Safety building volume, as we
4 have been able to go back down to a little smaller
5 than ABWR in that we don't have as many active pumps
6 to house.

7 DR. BONACA: What's the projected cycle
8 length with 1132? I mean, do you have a --

9 MR. HINDS: It's designed for a two-year
10 cycle.

11 DR. BONACA: Two-year cycle. That's a lot
12 of bundles.

13 MR. HINDS: It is. It is.

14 DR. POWERS: I mean, when you set up for
15 a two-year cycle, does your balance plant tower under
16 that kind of a cycle?

17 MR. HINDS: Would the?

18 DR. POWERS: The rest of the plant outside
19 the steam supply system itself going to tolerate a
20 two-year cycle?

21 MR. HINDS: Yes, we've designed it for
22 that, and we believe it can.

23 DR. POWERS: Because that's usually the
24 problem people run into.

25 MR. HINDS: Yes, certainly.

1 DR. POWERS: The fuel is fine. It's just
2 that you've got to pick something else in the --

3 MR. HINDS: Certainly the plant needs to
4 be well maintained. I'll agree with that.

5 DR. POWERS: Yeah.

6 MR. HINDS: Certainly. Here's a cut-away
7 showing the reactor vessel and highlighting some
8 differences. Many things within the vessel are
9 similar to past designs, but then there are
10 differences.

11 Differences, of course, we already talked
12 about this. A taller vessel; the primary reason for
13 the taller vessel is because of the addition of the
14 chimney section.

15 DR. POWERS: Yeah. Explain that.

16 MR. HINDS: Okay. In the chimney section,
17 that aids in the natural circulation, aids in the flow
18 of steam insuring that we have a smooth, stable flow
19 path, that there are no chances of oscillations
20 between regions of the core. It gives it a straight
21 shot out to the steam separators and steam dryers, and
22 the separators and dryers are similar to past.

23 DR. POWERS: It's a consequence of having
24 this bigger core?

25 MR. HINDS: The chimney is primarily there

1 because it's a natural circulation, and I guess couple
2 that with a large core as well. It helps promote the
3 natural circulation, the steam portion of that flow
4 path.

5 DR. DENNING: Are there flow stability
6 problems without it? Is it clear or don't you really
7 know? Is it just -- I mean, if you didn't have it in
8 there, would there be a stability problem?

9 MR. HINDS: It would be much more
10 difficult to prove that we had a stable lack of flow
11 oscillations.

12 DR. SHACK: Now when I want to look for
13 IASCC on the top of that, how do I do that?

14 MR. HINDS: Okay. Well, the refueling
15 idea is to go down through the chimney, so if that's
16 what you're -- refueling tools, as well as visual
17 observations.

18 DR. SHACK: Crack this thing.

19 MR. HINDS: As well as visual observations
20 and tooling would need to go down through the chimney
21 section. And the chimney is a four by four
22 arrangement. It's not one cell, but it's still --

23 DR. SHACK: Can I replace the top guide?

24 MR. HINDS: Can you replace the top guide?

25 DR. SHACK: Is it welded in, or is it

1 bolted in, is it sitting there?

2 MR. HINDS: I believe it's bolted in, and
3 bolted in top guide, bolted in chimney sections.

4 DR. SHACK: So I can take this apart like
5 an erector set.

6 MR. HINDS: Well, it's not a normal outage
7 activity to take that apart, but it would be something
8 that could be done. It would be a major evolution,
9 though.

10 MR. BEARD: This is Alan Beard of GE.
11 Specifically to that question, we are using the
12 technology that we used on the ABWR. It is carved out
13 of a single piece of stainless steel. We're not going
14 to create plates and put them together in eggshell.
15 It's milled from a solid piece of steel.

16 MR. HINDS: Right. As far as the actual
17 grid within the top guide, yes.

18 DR. SHACK: But it's not welded to the
19 support --

20 MR. BEARD: It is bolted in. It can be
21 removed. It's not a planned evolution, but certainly
22 one we're capable of doing in an extended outage.

23 DR. WALLIS: You said the steam dryer is
24 like the usual ones?

25 MR. HINDS: Yes, it is. Of course, it's

1 --

2 DR. WALLIS: I thought that was something
3 which was currently evolving.

4 MR. HINDS: Well, it is --

5 DR. WALLIS: It isn't the usual one
6 anymore.

7 MR. HINDS: It is similar to the evolved
8 steam dryer, I guess I should say; meaning, lessons
9 learned from --

10 DR. WALLIS: It's not the big heavy one.

11 MR. HINDS: Correct. Correct, the big
12 heavy one. The lessons learned from the Quad Cities
13 and others, so we're -- certainly those lessons have
14 -- the same people working on our dryer design are the
15 ones working on the corrective actions from the older
16 plant dryer issues. So yes, those lessons have been
17 incorporated into this design.

18 Other differences - you notice the nozzles
19 are up above core region. Here's core region here.
20 The only penetration is down here. We've got control
21 rod drives, and then we've got a bottom head drain
22 line. Let's see. I guess that's it. Other areas are
23 very similar to past designs.

24 DR. WALLIS: So what is the biggest pipe
25 you've got below the steam pipe, I guess?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. HINDS: Well, the --

2 MR. SIEBER: Feedwater nozzle.

3 DR. WALLIS: What's the biggest pipe as
4 you go up? You've got fairly little pipes, and the
5 equalizing line is small.

6 MR. HINDS: I believe it's either the feed
7 line or the steam line as far as the size of pipe.
8 And if any of you know the --

9 DR. WALLIS: It's way up there.

10 MR. HINDS: Yes, the steam line is right
11 out here.

12 DR. WALLIS: And the feedwater lines are
13 next to it.

14 MR. HINDS: Feedwater line right there.
15 And they're all --

16 DR. WALLIS: The pipes are all up there.

17 MR. HINDS: And they're all very high.
18 And the core is down in here, so not to be -- with a
19 visual, sometimes when people first look at it, they
20 think this is the core, but the core is right here, so
21 it's down there below these nozzles. Of course, there
22 is a bottom head drain line, but other than that, the
23 other lines are relatively high. There's a GDSC
24 equalizing line. And again, we've got some more
25 slides that will show some details on that.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 At this point, I was going to hand-off to
2 Alan Beard. He'll help get into --

3 DR. RANSOM: One question.

4 MR. HINDS: Yes.

5 DR. RANSOM: Was the equalizing line
6 between the blow-down suppression cool and the vessel
7 one item?

8 MR. HINDS: We have an equalizing line on
9 it.

10 DR. RANSOM: SPWR had an equalizing --

11 MR. HINDS: It had an equalizing on here.
12 It'll be shown in one of these slides that we're
13 getting ready to come --

14 DR. RANSOM: It's not shown on the
15 schematic, but --

16 MR. HINDS: Okay. It's on one of the
17 upcoming schematics here, and yes, there is an
18 equalizing line, which Alan is going to cover here in
19 just a second.

20 MR. SIEBER: I take it your refueling
21 pools are about 100 feet long? I mean, they would be
22 -- that whole vessel from the bottom of the control
23 rods to the top of the vessel is about 100 feet.

24 MR. HINDS: Oh, the distance down to reach
25 a fuel bundle?

1 MR. SIEBER: Yes. And, of course, you
2 have to add on -- you subtract from the top of the
3 fuel down to the bottom of the vessel, but you have to
4 add the depth of the water up above, so that makes for
5 a long tool. Just controlling that I would think
6 would be a challenge.

7 MR. HINDS: It's a long reach, yes. And
8 so it does present a challenge in the design, in that
9 we do have a long reach, and we need to have the
10 proper equipment able to handle that. So yes, the
11 refueling bridge is a challenge in this one.

12 MR. SIEBER: Now have you thought at all
13 about how you would stabilize that tool because it
14 would tend to want to move around.

15 MR. HINDS: Yes, we have some thoughts on
16 that. We do have some further detail design to do of
17 that.

18 MR. SIEBER: I'm sure I'll learn here
19 later.

20 MR. HINDS: No, that's a very good point.

21 MR. SIEBER: All right. Thank you.

22 MR. HINDS: Very good point.

23 DR. WALLIS: Why is it such a big chamber
24 between the tubing and the steam separator assembly?
25 There seems to be a big chamber. You have this

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 chimney with all these dividers in it.

2 MR. HINDS: Okay.

3 DR. WALLIS: And then you have what looks
4 like a meter or two of space before you get into the
5 steam generator. Presumably, everything will get more
6 or less mixed up uniformly in there or something, or
7 is it -- what's supposed to go on in there?

8 MR. HINDS: I don't think it's that --
9 unless it's mischaracterized on the drawing.

10 DR. WALLIS: This is quite a long thing,
11 so I was wondering why it was so long.

12 MR. HINDS: Okay. Well, one thing that
13 does need to be updated on this drawing is the top of
14 the chimney area is actually flat across here. It
15 appears in this drawing that it's --

16 DR. WALLIS: It appears to be a conical
17 sort of thing.

18 MR. HINDS: Yes, it appears conical, but
19 it's actually flat across there, so that's one thing
20 that needs to be updated in this drawing.

21 MR. SIEBER: That depends on the view you
22 took.

23 MR. HINDS: And that's just the area where
24 the steam is heading to the separators, but as far as
25 the reason for that -- you got any comments on that,

1 Alan?

2 MR. SIEBER: There is a lot of separation
3 going on in that empty space there, because coming up
4 through the chimney you have a mixture of water and
5 steam bubbles.

6 MR. HINDS: Sure.

7 MR. SIEBER: And once it escapes the
8 chimney, the water has a tendency to flow back down
9 and the steam continue on up. You need that much
10 space to do that, I would think.

11 MR. BEARD: Yes. It's part of the element
12 of you're starting to get the water --

13 MR. SIEBER: Separating out.

14 MR. BEARD: -- training out as you come up
15 through the chimney, the part --

16 MR. SIEBER: Right.

17 MR. BEARD: And then when we break through
18 there, it allows the steam to spread out, and we get
19 equal flow up through the separators --

20 MR. SIEBER: That's right. Otherwise, you
21 would have so much carry-over into the separators,
22 that the separators would have to be huge in size, I
23 would think.

24 MR. HINDS: It's a pretty large separator;
25 but, yes. It's an area for the steam to mix, carry up

1 into the separators, let the water flow back down into
2 the down-come area.

3 DR. WALLIS: It depends a bit on what you
4 call water level, doesn't it, on this whole thing.

5 MR. SIEBER: Well, that's sort of in the
6 eye of the beholder.

7 DR. WALLIS: I guess we'll get into that
8 some time down the road.

9 DR. RANSOM: The chimney is primarily to
10 prevent -- well, it's presenting transition to --

11 DR. WALLIS: We don't know what the void
12 fraction is in there, do we?

13 DR. RANSOM: So once you reach the
14 disperse rate, it's no longer needed.

15 DR. WALLIS: is someone going to explain
16 this? Do you have dispersed flow in the top of the
17 chimney and a sort of sluggy flow in the column? Is
18 there some sort of level in there, or is the level
19 above the chimney, or what? Could you tell us that
20 now, perhaps?

21 MR. HINDS: Well, there's a void fraction
22 dependent upon the operating condition of the power
23 level operating conditions. We've got a void fraction
24 exiting the core region, and then basically lower
25 quality steam coming up through the chimney heading to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the separators.

2 DR. WALLIS: Where's the separation?
3 Where's sort of the water level above which you get
4 the high quality mixture? Is it in the chimney
5 somewhere, where is it?

6 MR. HINDS: Yes. I mean, the core -- the
7 top of active fuel does not -- it is covered. The top
8 of active fuel is covered, including during accident
9 conditions.

10 DR. WALLIS: The void fraction you get
11 there is the same as the void fraction going up to the
12 chimney pretty well?

13 MR. HINDS: I believe that is correct. I
14 mean, there's no additional boiling once it occurs
15 there, so the void fraction --

16 DR. WALLIS: There's no sort of level or
17 anything in the chimney.

18 MR. HINDS: Right. It's a mass of steam.
19 It's a mass of steam water mixture going up there with
20 a given void fraction dependent upon power level. If
21 you want to add anything to that.

22 MR. BEARD: No, I think David has stated
23 it quite well, that the transition between solid water
24 to a steam water mixture occurs down in the core. And
25 once we exit out through the top guide, it's a pretty

1 well consistent steam water mixture up through the
2 partitions, and on up the --

3 DR. WALLIS: If the steam disappeared, the
4 water would all settle down into the core.

5 MR. BEARD: That's correct, and I'll talk
6 about that in the next couple of slides what happens.

7 DR. WALLIS: What we understood was that
8 there was lots of water in there; and, therefore, it
9 was safe. But if you're going to have most of the
10 chimney filled with steam, then that takes away your
11 lots of water.

12 MR. BEARD: And I will be addressing that
13 in another slide or two.

14 DR. WALLIS: You'll address that.

15 MR. HINDS: Yes, it does collapse down
16 such that the transient response is that the water
17 settles down, the core is covered, and the transient
18 -- the accident analysis shows core covered.

19 DR. WALLIS: You've got two sort of
20 conflicting requirements. One is to get dry steam,
21 you don't want a lot of water up there.

22 MR. HINDS: Yes.

23 DR. WALLIS: But to get safety in accident
24 conditions, you want a lot of water up there.

25 MR. HINDS: Right. And the dry steam then

1 occurs all the way up here --

2 DR. WALLIS: The chimney is fulfilling two
3 functions. Right. Okay.

4 MR. BEARD: And the next slide, I think
5 we'll be able to address that. I wanted to go back
6 and touch on one other thing for David. On the bottom
7 head drain lines for reactor water cleanup, we
8 actually have four lines, and we have learned some
9 lessons from our previous designs. We're no longer
10 coming straight up through the bottom head. We have
11 four nozzles out on the periphery of the bottom head
12 come in, and then we have pipes that actually sweep
13 down inside the vessel to draw suction out of there,
14 so that we can remove the debris and any of the cold
15 water that might be accumulating down there.

16 DR. WALLIS: This is because?

17 MR. BEARD: Because there's a lot of
18 operating plants out there that have gotten so much
19 debris down in that bottom head drain, they can no
20 longer pull water through it, so we're trying to
21 prevent that nozzle from getting plugged up.

22 Also, the severe accident stuff looks at
23 it and says there is a possibility if you have
24 chlorine, that's going to be the place that it's first
25 going to attack, so we've eliminated that weakness.

1 Okay. Real quickly I wanted to touch on
2 just a couple of design improvements. These are
3 primarily made to address a lot of the maintenance
4 concerns that our utilities have been explaining to
5 us. One, we have made the decision that this plant
6 will be capable of 100 percent steam bypass, and in
7 doing that, that will allow us to transition to an
8 island mode of operation should you lose your
9 connection to the grid. One of the major points
10 behind that decision was what happened two years ago
11 here in the northeast with the massive blackout, so we
12 felt it wasn't a whole lot of money to do that, and it
13 made a lot of sense to go ahead and provide that
14 capability.

15 As David said, we are using our fine
16 motion control rod drives. Operational experience
17 already with the ABWRs operating in Japan, also a lot
18 of operational experience with similar designs in
19 Europe. Shoot-out steel is just a maintenance
20 nightmare for the utilities who have it. We've been
21 able to eliminate it, same thing we did with the ABWR.

22 DR. WALLIS: What is it?

23 MR. BEARD: Shoot-out steel was our
24 solution to handling the failure of a CRD housing weld
25 to the vessel, such that if that were to occur, it

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 restrained the shoot of a control blade from being
2 ejected from the core. We now have an internal
3 restraint system that provides that protection.

4 Integrated head vent pipe, this is just an
5 issue that's trying to get some time off of our
6 critical path. We basically incorporated a pipe
7 inside the RPV head, and then the flanges that make
8 that connection are built into the RPV head flange and
9 the vessel flange itself.

10 Improved in-core instrumentation. We have
11 taken -- historically, we had start-up range monitors,
12 we had intermediate range monitors. We've combined
13 those into a single operating device. The previous
14 designs had very sensitive detectors in them, such
15 that we had to withdraw them from the core once we got
16 up into the power range neutron flux. With this
17 design, we don't need to do that, so we've eliminated
18 a lot of headache, again, with the maintenance of
19 those devices. And then our local power range
20 monitors or LPRMs, which make up part of the average
21 power range monitor detection; previously, we had a
22 system called the Traversing In-core Probe, the TIP
23 system, involves three-eighths inch tubings that
24 allowed us to insert a detector from outside
25 containment up next to all the detectors in the core,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 and then when we withdraw it, we were able to compare
2 the signals from both of those, and we could calibrate
3 the individual detectors that way. We now accomplish
4 that with what we call a gamma thermometer technology.

5

6 We've had some lead test assemblies out,
7 had very good results coming back from that, and we're
8 going to go ahead and incorporate that in as part of
9 the base ESPWR design.

10 DR. WALLIS: While you're improving in-
11 core instrumentation, do you have anything that
12 measures where the water is, or what the void fraction
13 is, or what the flow rates are in various parts of the
14 core? Is that something which is just calculated?

15 MR. BEARD: It is calculated primarily;
16 however, there are two thermal couples on the bottom
17 of each of the LPRM strings just below the core plate
18 so that you're measuring the water flow up through
19 that, or measuring --

20 DR. WALLIS: Calculating whether it's
21 superheated or not? If it's saturated, thermal couple
22 doesn't tell you anything, would it?

23 MR. BEARD: Well, it's sub-saturated
24 because it hasn't heated up yet.

25 DR. WALLIS: Well, it tells you that.

1 MR. BEARD: Yes.

2 DR. WALLIS: So it's way, way down.

3 MR. BEARD: It's immediately below the
4 core plate. It's just before we come into the fuel
5 range.

6 DR. WALLIS: Nothing above which tells you
7 what's going on in terms of hydraulics.

8 MR. BEARD: Correct. No, the water level
9 we're measuring is, we're measuring the area outside
10 the annulus, using our typical differential
11 pressure --

12 DR. WALLIS: And you're calculating
13 everything else?

14 MR. BEARD: Excuse me?

15 DR. WALLIS: Then you calculate everything
16 else.

17 MR. BEARD: Yes.

18 DR. KRESS: Are we going to hear more
19 about the gamma thermometer concept?

20 MR. BEARD: I did not have anything
21 prepared. I can try and answer your questions. I'm
22 not a real expert in the area, but --

23 MR. SIEBER: Well, let me ask a specific
24 question about those. Those gamma thermometers are
25 not known to be as accurate as other types of active

1 nuclear instrumentation. Is the accuracy of the gamma
2 thermometer, that's really dependent on the geometry,
3 is that good enough for the purpose that it will be
4 used for?

5 MR. BEARD: All our calculations indicate
6 yes, it's more than adequate to the serve the purposes
7 we need to do, to calibrate our individual neutron
8 detectors within the core.

9 MR. SIEBER: Yes, but I guess you agree
10 that they aren't as accurate as some other types.
11 Right?

12 MR. BEARD: Yes. There's certainly
13 technologies out there that can be a lot more
14 accurate, but for the purposes of making sure that
15 we're tracking what's going on with the depletion of
16 our --

17 MR. SIEBER: Yes. It's good enough.
18 Right?

19 MR. BEARD: Yes.

20 MR. SIEBER: Okay. Gamma thermometers
21 don't deplete.

22 MR. BEARD: No, but I mean the in-core
23 instrumentation does deplete, so it has to be changed
24 out anyway.

25 MR. SIEBER: Yes. Okay.

1 MR. BEARD: Natural circulation, there
2 were questions earlier about why do we need that big,
3 tall chimney? Well, the bottom line is we need to get
4 differential head, we need a driving head to do that,
5 so we've got to have some sort of area where we can
6 get that cold dense water offsetting the pressures
7 drop going in here. So we have 25, 30 feet of very
8 cold - I shouldn't say very cold - excuse me - sub-
9 cooled water in this annulus space out here. This is
10 the water that when we talk about we've got a large
11 volume of water inside the vessel, it's the water out
12 in this annulus space and up around separator pipes.

13 DR. WALLIS: So you can make the annulus
14 bigger without changing the head just in order to
15 accommodate more water.

16 MR. BEARD: Yes.

17 DR. WALLIS: This is an independent design
18 you can make to hold more water.

19 MR. BEARD: Yes, they could be uncoupled,
20 correct.

21 DR. WALLIS: Make the vessel bigger
22 presumably, if you had the same core.

23 MR. BEARD: If we needed to do that, yes,
24 that's true. Our calculations indicate we don't need
25 it. We've got enough water out there to make sure,

1 and those come up later on.

2 DR. WALLIS: And the assurance that you
3 don't get any flow oscillations in this thing is
4 calculations of some sort?

5 MR. BEARD: It's calculations, it's tests,
6 data from the --

7 DR. WALLIS: Oscillation in the annulus
8 going up and down. It's not going to happen, right?

9 MR. BEARD: Well, I mean, the annulus is
10 going to be -- level is going to be controlled by our
11 feedwater level control system. We're monitoring what
12 that level is, and feedwater is going to -- the amount
13 of feedwater coming in --

14 DR. WALLIS: It starts to oscillate, then
15 you're going to have feedwater flow oscillating and
16 everything. All that's just a calculation, is it?
17 You're going to get into this in detail, I suppose,
18 down the road.

19 DR. KRESS: We should have a thermal
20 hydraulic --

21 DR. WALLIS: Either you have a natural
22 circulation thing to worry about some sort of
23 oscillation starting.

24 MR. BEARD: Well, the oscillation is going
25 to be a result of what's going down in the core. It's

1 not a result of what's going --

2 DR. WALLIS: Well, it will also make the
3 annulus go --

4 MR. BEARD: Well, the feedback will
5 obviously be up in the sub-cooled water, but it's
6 going to be because of what's going on in the --

7 MR. SIEBER: You built some test
8 facilities to test this chimney, right?

9 MR. BEARD: No. Our test facilities were
10 primarily for testing the passive safety-related
11 system.

12 MR. SIEBER: Taken from somebody else's
13 work.

14 MR. BEARD: Right. The Canadians did some
15 work, and then there's obviously the Dodeward facility
16 that is also natural circulated that we have a lot of
17 information from.

18 DR. KRESS: I presume you've got a pretty
19 good neutronic analysis of the flat core with that
20 many fuel elements and pretty high volume fraction to
21 a great deal of it?

22 MR. BEARD: Again, that's not my area of
23 expertise, but the guys who are experts in that area
24 assure that we are a long way away from --

25 DR. KRESS: Well, make a note that at some

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 point during our review we'd like to see that.

2 MR. BEARD: Obviously.

3 MS. CUBBAGE: Yes. We're planning to come
4 -- GE will be back in either January or February for
5 a full day with the thermal hydraulic subcommittee,
6 specifically on the issue of stability. The Staff's
7 been reviewing their --

8 DR. KRESS: No, there's normal BWRs to get
9 into what you're about. But here, I'm worried about
10 one part of the core not communicating with the other
11 part, having local areas that are unstable with
12 respect to each other.

13 MR. SIEBER: Well, you're talking about
14 the potential for xenon transients and things like
15 that.

16 DR. KRESS: Yes. Exactly.

17 MR. SIEBER: That give you oscillating
18 tilts.

19 DR. KRESS: Yes.

20 MR. SIEBER: And that is a pretty big
21 core. The power -- it probably is not real high.

22 DR. KRESS: Yes, that's exactly what I'm
23 wanting to hear about, so put that on your list.

24 MS. CUBBAGE: We've already asked --

25 DR. WALLIS: I'm thinking instead of

1 having one day just on this one issue, the thermal
2 hydraulics, we probably need several days.

3 DR. KRESS: We may need several days.

4 MR. SIEBER: Days, weeks.

5 DR. KRESS: Years.

6 MR. BEARD: Just one other thing I wanted
7 to comment on this slide. The other -- we have a lot
8 of water out here to maintain or make sure that we can
9 keep the core covered during all transients and
10 design-basis accidents. But the advantage of this big
11 volume being hefty is our pressurization transients
12 really are very benign relative to our operating BWRs.
13 In this case, design-basis accidents and anticipated
14 operational occurrences, with the exception of ATWS,
15 our safety relief valves are never calculated to come
16 open.

17 DR. KRESS: You've got a big capacity.

18 MR. BEARD: We've got a very huge
19 capacity. That's with the isolation condensers
20 working. If the isolation condensers do not work,
21 it's still five minutes before the pressure of this
22 reactor vessel would get up to the point that we'll
23 lift the safety relief valve, so there's a real big
24 advantage to this huge volume of steam that we have in
25 this area right here.

1 I'll talk real briefly about anticipated
2 operational occurrences. We recognize that those
3 transients are initiated to accidents, and so we're
4 taking efforts to try and minimize those from being
5 the initiating transients. Primarily, what we have
6 done is we have adopted a triplicated control system
7 for both feedwater level control, as well as steam
8 bypass and pressure control. Those are the big
9 hitters on BWRs as far as transient initiators, and so
10 with the adoption of that improved technology, or
11 control instrumentation technology, we feel that those
12 initiating events will be significantly decreased.
13 Rick will talk a little bit more about that when he
14 gets into the PRA.

15 Large steam volume I already talked about.
16 There's no pressure over-shoot. It's a very benign
17 pressurization transient. Our critical power ratio is
18 lower than you would see with a typical forced
19 circulation BWR. Our limiting event for critical
20 power ratio is a loss of feedwater heating, but it's
21 a very slow evolving event, very easy for the operator
22 to recognize and take mitigative action to terminate
23 that event.

24 Loss of coolant accidents - we've got a
25 large margin of fuel uncover. In fact, we never

1 uncover the core for our design-basis accidents, or
2 any of our anticipated operational occurrences. And
3 we're only crediting passive systems when we make that
4 statement. And we are designed for at least 72 hours
5 of capability without reliance on any sort of AC
6 power.

7 DR. WALLIS: So what is it that ever gives
8 you any core damage?

9 MR. BEARD: If I keep my core fully
10 covered with water, I can't melt the core.

11 DR. WALLIS: Okay. So what do you have to
12 do to get core damage, because you do have some core
13 damage frequency. It's not zero.

14 MR. BEARD: Rick will get into that, but
15 the core damage frequency would be that we can't get
16 water back in the vessel for whatever reason.

17 MR. SIEBER: Or you have a hole in the
18 bottom.

19 DR. KRESS: It must be long-term. You can
20 actually dry it out.

21 MR. BEARD: Well, no. I think I'll be
22 able to address that in the slides when I get to the
23 isolation events from the PCC. And then transients
24 without scram - again, the large contributor to ATWS
25 for BWRs was this cool discharge volume that we had

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 with our older locking piston CRD mechanisms. With
2 the fine motion control rod drive, we still have a
3 hydraulic scram, but we only have insert lines so
4 there is no scram discharge volume, so that part of
5 the initiating frequency has been entirely removed
6 within this design.

7 We do have diverse means for inserting the
8 control rod into the core should the hydraulic
9 function fail. That's not what we credit for
10 satisfaction of the ATWS rule. We do have a standby
11 liquid control system for that purpose, but our first
12 attack on an ATWS is if we fail to hydraulically
13 insert the rods, there is circuitry that automatically
14 commands the FMCRDs to go into the run-in mode and to
15 try to insert the blades electrically. If that fails,
16 then we would use the liquid poison system, the
17 standby liquid control system to inject sodium
18 pentaborate and bring the reactor sub-critical.

19 DR. DENNING: You control power in this
20 case with control blades.

21 MR. BEARD: That is correct.

22 DR. DENNING: Now does ABWR do that? You
23 talked about --

24 MR. BEARD: No, the ABWR we have the ten
25 reactor internal pumps, so we were varying the core

1 flow by adjusting the speed.

2 DR. DENNING: So you've got a bite in the
3 core all the time? I mean, does it lead to quite a
4 bit of difference in the burn-up of the fuel and your
5 control of --

6 MR. BEARD: All the analysis our core
7 group has done says we will be able to get the same
8 type of core performance from this reactor as we are
9 with the forced recirculation. There is an increased
10 duty cycle on the FMCRDs, but we have done plenty of
11 testing to say that's not going to be a problem for
12 the mechanisms themselves.

13 With the accumulator standby electric
14 system versus the old motor-driven pumps that we have,
15 we are able to get the sodium pentaborate into the
16 vessel a lot faster. It's about five times faster
17 than with the pump systems, and it's about five times
18 greater than what is deterministically required by the
19 ATWS rule.

20 Bottom line is we can go ahead and get the
21 reactor sub-critical without having to depressurize
22 the vessel. And once we do get sub-critical, the
23 isolation condensers will terminate steam flow to the
24 suppression pool. We'll come back, the pressure in
25 the reactor pressure vessel will come back below the

1 safety valve set point, safety valves will reseal and
2 we're back into a closed loop system.

3 DR. WALLIS: And the operators don't have
4 to do things.

5 MR. BEARD: For the first 72 hours this
6 plant is designed such that there should be no --

7 DR. WALLIS: In an ATWS?

8 MR. BEARD: It an ATWS, that's all
9 automated, as well.

10 DR. WALLIS: Okay.

11 MR. BEARD: Okay. This is a very high
12 level cartoon of the passive safety systems. It does
13 not have the standby liquid control system on it. The
14 IC, we have four isolation condensers, anomaly four by
15 33 percent, so we can have a single failure in one of
16 those isolation condensers and still have 100 percent
17 of the capacity that we need for our design-basis
18 accidents and our transients.

19 PCCs, there are six of them. Again, we
20 could fail one of those. What the failure mechanism
21 is, we haven't figured out, because it is entirely
22 passive. There is nothing in that system that needs
23 to reposition itself to put the PCCs into operation.
24 And then we have the gravity-driven cooling system.
25 We've got three bodies of water in the upper dry well

1 airspace or upper dry well. They are elevated above
2 the core, as you can see by this figure, and they are
3 the means that we have for flooding the core and
4 maintaining core cooling.

5 I'm going to talk more specifically about
6 each of those systems in the following slides. The
7 equalizing line I heard asked about before. Mr.
8 Graham, I wanted to go back to the one question you
9 had earlier. PCC heat exchanges are treated as part
10 of the primary containment boundary. The isolation
11 condensers are not. We do have containment isolation
12 valves to isolate those heat exchangers, if you were
13 to develop a leak out in one of those --

14 DR. WALLIS: What's new in this is really
15 those heat exchanges and condensers, and they've all
16 been tested full scale.

17 MR. BEARD: We have done full scale
18 testing of a module, one-half of one of these. We
19 didn't have both pieces and --

20 DR. WALLIS: It was full scale.

21 MR. BEARD: It was a full scale test.

22 DR. WALLIS: And the pools are routine,
23 and the vents and all that, but some interaction
24 between the components is something new here.

25 MR. BEARD: There was also scale testing

1 done of the entire interactive --

2 DR. WALLIS: The entire system.

3 MR. BEARD: Yes.

4 DR. RANSOM: You've got eliminate of the
5 vacuum breakers?

6 MR. BEARD: Well, we still have three
7 larger vacuum breakers not shown on this figure, but
8 they are located in the diaphragm floor itself.

9 DR. WALLIS: These were the new mysterious
10 design which never fails. Is that the one?

11 MR. BEARD: We hope they -- well, I
12 shouldn't say hope. We don't believe they will fail.
13 We've looked at them in attempts of improved design.

14 DR. WALLIS: They are a different design
15 from before.

16 MR. BEARD: They are. They are more of a
17 lift-type than the swing-type.

18 DR. WALLIS: They're much more reliable
19 now?

20 MR. BEARD: Yes.

21 DR. WALLIS: And that's been proven?

22 MR. BEARD: We have done a testing program
23 on that to demonstrate the reliability, that they also
24 have a means to establish closure should the passive
25 nature of that valve fail.

1 DR. WALLIS: I guess that's another thing,
2 the thermal hydraulic subcommittee should look into
3 all these new features that we haven't seen before.
4 Tests of these, we'd like to see the evidence as to
5 the vacuum breakers, I think, things like that. We'll
6 work that out.

7 MR. BEARD: Okay. Passive safety systems,
8 two of the three big ones are the isolation condenser,
9 the PCC. Isolation condenser has replaced the old
10 RCIC system in our previous designs. It allows us to
11 basically remove heat in a closed loop system. We
12 have no steam venting off through the safety relief
13 valves. Basically, it works, we take steam out of the
14 vessel. It enters into the upper steam drum, is
15 distributed out through the tubes. As the steam
16 condenses in those tubes, the condensate accumulates
17 in the lower drum, and the is returned back to the
18 reactor pressure vessel in the outer annulus part of
19 the vessel.

20 PCCs, once we have a LOCA or if we need to
21 depressurize the vessel and induce a LOCA, the steam
22 in the dry well, if it's a LOCA, the initial
23 pressurization of the dry well is handled by the stem
24 or the normal pressure suppression function. We
25 depress the water column in the connecting vent,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 uncover the horizontal vents, the steam exhausts out
2 into the suppression pool. It's condensed limiting
3 the pressurized as a result of the large break LOCA.
4 That goes on for 30-40 seconds, at which time the PCCs
5 have established their driving flow through them.
6 They will start managing the pressure. The pressure
7 in the dry well will start to decrease, and the vents
8 here will recover themselves.

9 At that point, we do not expect that we
10 ever would have a need for these to -- or the pressure
11 in the dry well will never go up again to the point
12 that we actually have to uncover those vents again, so
13 there's no more heat being put in the suppression pool
14 via that mechanism. There is another way that we do
15 get some heat in the suppression pool during the 72
16 hours, and I'll talk to that in an upcoming slide.

17 In 72 hours the passive capability is
18 basically accomplished. We have this heat exchangers
19 sitting in these bodies of water. We've got a huge
20 amount of water sitting in the elevated location in
21 our reactor building. You see actually three
22 different pools. Inter-connected pool here with all
23 these heat exchangers, another large inter-connected
24 pool for all these heat exchangers, and then we have
25 this body of water in the PRV cavity in the equipment

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 pool that is available to extend us out to a 72-hour
2 capability.

3 Each one of the PHDHs is in it's own
4 compartment. We compartmentalize that to allow us to
5 do maintenance on individual heat exchange without
6 having to drain the entire pool. There is a pipe that
7 connects the two pools here. In the event that you
8 wanted to do maintenance, you would close that valve
9 and then pump the compartment out to do any
10 surveillances or whatever might be necessary on those
11 particular heat exchangers.

12 DR. POWERS: OSHA must just absolutely
13 love that one.

14 MR. BEARD: It's a confined space, yes.

15 DR. WALLIS: Why is that pool divided by
16 that wall that has those two white things in it?

17 MR. BEARD: As part of the structural
18 arrangement of the building.

19 MR. SIEBER: The middle one is the reactor
20 head.

21 MR. BEARD: Yes. Right.

22 DR. POWERS: And an important
23 accouterment.

24 DR. WALLIS: I was looking for a big green
25 pool.

1 MR. BEARD: That's just one of the column
2 lines, and what happens is up on the refuel floor is
3 the building wall actually steps in at the refuel
4 floor elevation, so that's -- at the floor right above
5 this, the building wall runs along that line and that
6 line, so it's just a structural element.

7 Again, I'm going to get into more detail,
8 but the gravity-driven cooling system, once the vessel
9 is depressurized, we now can take advantage of the
10 differential head between that elevated pool and the
11 elevation that we're injecting the water into the
12 vessel. We have three pools inside the containment
13 air space. The volume of water in those three pools
14 is such that when we open up the valves, not only do
15 we flood the RPV and keep the water level in the RPV
16 above the top of active fuel, but if we have a line
17 break, there's sufficient water in those pools, such
18 that the water in the RPV is kept above TAF. We also
19 fill the entire lower dry well region up to a point
20 that it also is above TAF.

21 DR. WALLIS: Those pools here are round,
22 but the pool on the top is rectangular. Is that it?

23 MR. BEARD: They're kind of -- well,
24 they're round on the outside, and then they're linear
25 on the inside surfaces.

1 DR. WALLIS: But then the pool you showed
2 us that had the green pool, that's on top of all of
3 this, is it?

4 MR. BEARD: Yes.

5 DR. WALLIS: Okay. It's rectangular and
6 it fits on top of all of this.

7 MR. BEARD: Correct. The ICMFCC pools are
8 on the --

9 DR. WALLIS: And they're rectangular
10 things.

11 MR. BEARD: Correct. Okay. LOCA water
12 response, just wanted to compare to our previous
13 designs in our BWRs four through sixes, which really
14 represents the vast majority of the fleet that we have
15 domestically. In the design-basis accidents, the best
16 we could say was we could maintain two-thirds core
17 height coverage, because of the assumption that --

18 DR. WALLIS: This is two-phased level, or
19 is this --

20 MR. BEARD: Single phase.

21 DR. WALLIS: -- collapsed level?

22 MR. BEARD: Collapsed level.

23 DR. WALLIS: It's a collapsed level, so
24 the two-phase level is way above that.

25 MR. BEARD: Well, this is after we SCRAM

1 in a reactor, so there's very little two-phase flow
2 actually going on. You, obviously, will be boiling,
3 but that's not the vigorous boiling you'd have at
4 power operation. Two-third core height with our
5 existing plants because of the jet pump elevation and
6 the assumption that it was a recirc line break that
7 got you into the accident.

8 With the ABWR and the active systems, and
9 also the elimination of the external recirc pumps, or
10 the recirc piping loops, we were able to demonstrate
11 with active systems that the lowest we expected water
12 level ever to get to in design-basis accident
13 conditions was about a half a meter above the top of
14 active fuel. Now with the ESBWR, using just entirely
15 passive systems, the lowest water level we get is even
16 above that. This low water level in the ABWR was
17 occurring in the 40-second time frame, low water on
18 the ESBWR is occurring out in the 500-600 second time
19 frame.

20 DR. WALLIS: That's the very worst case.

21 MR. BEARD: That is the minimum water
22 level that we --

23 DR. WALLIS: With conservative assumptions
24 and things, too.

25 MR. BEARD: With design-basis assumptions,

1 yes.

2 DR. WALLIS: So it's conservative
3 assumption. This isn't some sort of a best estimate.
4 This is --

5 MR. BEARD: No, this is licensing basis
6 calculations.

7 DR. WALLIS: With conservatism in it.

8 MR. SIEBER: This is basically just a
9 pretty simple problem. It's just volume.

10 DR. WALLIS: Yes, I just wanted to get,
11 does he make conservative assumptions, or is this the
12 best estimate, in which case you'd --

13 MR. BEARD: Well, it's calculated by
14 TRACG.

15 DR. WALLIS: Oh, so this is a best
16 estimate. So there's uncertainties in that line? Are
17 you showing me the mean depiction or the worst case
18 prediction? You see what I mean?

19 MR. BEARD: Using TRACG, that is a worst
20 case calculated water level.

21 DR. WALLIS: Worst case. It's not the --

22 MR. BEARD: It's not the mean.

23 DR. WALLIS: -- best estimate. It's not
24 the mean. It's the worst.

25 MR. BEARD: It's not the mean.

1 DR. WALLIS: Uncertainties on --

2 MR. BEARD: For the limiting transient,
3 limiting design-basis LOCA, that is as low as our
4 water level gets calculated by TRACG.

5 DR. WALLIS: Worst assumptions about
6 everything.

7 MR. SIEBER: With a reactor vessel that
8 tall, you would expect a result like that. I mean,
9 there's a tremendous amount of water in that vessel.

10 MR. BEARD: And part of that is yes, you
11 can do simple hand calcs and see what the volumes of
12 water do once you remove them.

13 MR. SIEBER: Run a meter, may be even
14 better.

15 DR. WALLIS: So this is a bounding
16 calculation?

17 MR. BEARD: I don't want to use the term
18 "bounding". We're using TRACG, which is an approved
19 code, and that is the water level we have for --

20 DR. WALLIS: TRACG has uncertainties in
21 it. I just want to know how you're taking account of
22 them.

23 MR. BEARD: Ralph, if you would like to
24 jump in and bail me out, I would greatly appreciate
25 it.

1 DR. WALLIS: Which is it, is it neither?

2 MR. LANDRY: It's a strange feeling for
3 the Staff that they have to bail out the Applicant.

4 MR. BEARD: I appreciate it.

5 DR. POWERS: What do you mean? It happens
6 with regularity.

7 MR. LANDRY: This is Ralph Landry from the
8 Staff.

9 DR. POWERS: Sometimes the other way
10 around.

11 MR. LANDRY: The analysis that has been
12 done is similar to the analysis that was done when we
13 reviewed TRACG for LOCA for ESBWR and presented that
14 material to the subcommittee and to the full
15 committee. This is more of a bounding-type
16 calculation than a best estimate or realistic
17 calculation. It's using a realistic code, TRACG, but
18 they have not done the full uncertainty analysis as we
19 have seen in other places with a code for a LOCA
20 calculation.

21 DR. WALLIS: So this is a sigma thing, is
22 that what it is?

23 MR. LANDRY: This is using the two sigma
24 bounds on the parameters to stack up the worst limit
25 on each parameter important to the LOCA for this

1 design, so in reality, it's using a realistic code
2 with the worst case parameters, rather than doing an
3 uncertainty analysis and a statistical analysis on all
4 the parameters as inputs. So you've stacked up the
5 worst parameters for this analysis, and with the --

6 DR. WALLIS: At the two sigma level.

7 MR. LANDRY: I'm sorry, Bill.

8 DR. WALLIS: It's at the two sigma level.

9 MR. LANDRY: Correct.

10 DR. WALLIS: You reminded me of what I
11 heard before, but I was asking now to see if the new
12 generation of GE people knows what they did. At least
13 you remember, Ralph.

14 DR. POWERS: So what you're saying is you
15 knew the answer, and you were just testing everybody.

16 DR. WALLIS: I was testing him, and he
17 didn't seem to know.

18 MR. LANDRY: Graham has never given up
19 trying to test me.

20 MR. BEARD: We'll have to bring our
21 thermal hydraulics guys the next time.

22 DR. RANSOM: Was this level at 72 hours?
23 Is that the level --

24 DR. WALLIS: It's 500 seconds.

25 DR. RANSOM: It's 72 hours?

1 DR. WALLIS: No, 500 seconds, I think he
2 said.

3 MR. BEARD: That's the worst water level
4 before GDCS start to inject water into the vessel, or
5 the flow water. I shouldn't say inject, in this case
6 it's a vigorous flow.

7 Just to give you an orientation to how
8 this looks, one of the differences from the SBWR
9 versus the ESBWR, SBWR we were storing our spent fuel
10 up in the reactor building. We have made the decision
11 to go to separate spent fuel building, grade level on
12 this plant is right here. So the spent fuel pool is
13 entirely below grade and --

14 DR. WALLIS: When you take the fuel out,
15 you have to have some kind of arm which gets shorter
16 as it pulls the fuel out so you have room for it?

17 MR. BEARD: Well, we have a collapsible
18 mast auto refuel --

19 DR. WALLIS: The building doesn't look
20 tall enough to get everything in there.

21 MR. BEARD: There is a refueling platform
22 that goes here that has a mast that extends out in
23 sections, latch onto the bundle and then you retract
24 it.

25 DR. WALLIS: That's in sections.

1 MR. BEARD: Yes. It's a telescoping mast.

2 DR. WALLIS: You have to do that,
3 otherwise you'd never be able to do it.

4 MR. BEARD: Correct.

5 MR. SIEBER: You could add 50 feet to the
6 building.

7 MR. BEARD: I don't think we want to do
8 that. And then to transport fuel from the upper pools
9 here down to the lower pools, we use what we call our
10 incline fuel transfer system. We have that on our
11 Mark III containment. The big improvement here is on
12 Mark III, this actually penetrated the primary
13 containment, so we had a lot of surveillances that
14 went with that. It's now located entirely outside the
15 primary containment, no leakage concerns regarding the
16 usage of that.

17 Just wanted to give you an idea how much
18 water we are talking about here. Like I said, when we
19 dump these GDCS pools, these three pools, water level
20 in the reactor will basically be up to that line
21 approximately, as well as the water throughout this
22 area. So even the bottom head drain line break, we're
23 continuously dumping water out the bottom, you still
24 would have this water located here that would keep
25 water up above top of active fuel at all times.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Okay. Talk about the isolation condensers
2 real quick. They are designed to remove the passive
3 decay heat from the reactor pressure vessel when we're
4 at pressure. As pressure goes down -- well, as long
5 as the system is in tact, the isolation condensers
6 will perform their function. They will at some point,
7 when we get down to lower pressures, lose their heat
8 removal capability and you get into a state where you
9 kind of maintain a steady pressure, but it's a safe
10 shutdown state no matter what.

11 We have applied the single failure
12 criteria. We only need three out of the four to
13 operate. When you get to the schematic, you'll see
14 even beyond that we have some additional features that
15 say even if you have a single active failure, you
16 don't disable an isolation condenser by that single
17 active failure. It operates in all design-basis
18 conditions, except for medium and large break LOCAs
19 where we do depressurize the vessel. There is some
20 heat removal capability. We don't attempt to quantify
21 it or take credit for it.

22 Like I said, with the ICs, we have no lift
23 to safety relief valves for any of our design-basis
24 accidents or transients, and that includes isolation
25 from the main condenser. We think one of the real

1 attractive things about this design is when the ICS
2 take the heat from the nuclear steam supply system,
3 they transport it directly to the ultimate heat sink.
4 There is no intermediate step. When that water in
5 that pool starts to boil, the steam is exhausted out
6 directly to the atmosphere, and there's no additional
7 cooling step that we have to go through.

8 DR. WALLIS: How much venting do you have
9 to do with a large break LOCA?

10 MR. BEARD: Venting.

11 DR. WALLIS: This doesn't have enough
12 capacity to condense all that steam.

13 MR. BEARD: The isolation condensers in a
14 large break LOCA are not credited with the
15 condensation of the steam.

16 DR. WALLIS: So you just vent it to the
17 world?

18 MR. BEARD: Well, it vents into the
19 containment, could take the suppression pool, takes
20 the initial --

21 DR. WALLIS: It stays in the containment,
22 though. It doesn't come out into the world.

23 MR. BEARD: Correct.

24 DR. WALLIS: I wanted to make that clear.
25 It's not being condensed in the isolation condensers,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 but it's going into the pool and being condensed?

2 MR. BEARD: In a large break LOCA? The
3 initial part goes into the suppression pool. After
4 the initial blow-down, the PCCs are condensed in all
5 the steam.

6 DR. WALLIS: Just didn't want to give them
7 the impression that you were venting to somewhere
8 other than the containment, which is not true.

9 MR. BEARD: If I conveyed that impression,
10 I did not intend to do so. Okay. Those of you who
11 have been around the business, and this entire body
12 obviously has. When you look at the decay heat curve
13 with the three ICs in operation, look at the whole
14 pressure where it is, and very quickly, 20-30 minutes
15 in there you will start to see the very significant
16 cool down of the reactor pressure vessel. In fact, it
17 is so fast that if we try to limit or to maintain 100
18 degree Fahrenheit, 100 degree Fahrenheit per hour cool
19 down on the reactor pressure vessel will actually have
20 to start throttling back the ICs to make sure that we
21 stay within that cool down limit.

22 Having said that, we have designs such
23 that an occasional transient where you have excessive
24 cool down is not going to -- it's one of the analyzed
25 conditions for the reactor pressure vessel, but we

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 fully expect that the operators would step in and try
2 to start moderating the cool down.

3 DR. SHACK: Now your fluences on the
4 vessel are going to be similar to those from the ABWR?

5 MR. BEARD: Actually, the fluences are a
6 little bit higher. We have done calculations, and
7 they are within the acceptance criteria that we have
8 established.

9 DR. SHACK: But they are higher.

10 MR. BEARD: They are higher. The water
11 gap is smaller. We've got a lot more fuel in there,
12 but we are going with forged ring shells in that area,
13 that high fluence area, to address those concerns.

14 Okay. I just wanted to put up this
15 schematic of one of the single ICs. This is showing
16 the IC when it is in the standby condition. We do
17 keep the ICs in a hot standby condition during normal
18 operation, and what I mean by that is, the steam line
19 is open. We have steam up to basically the high point
20 of the system, right where I have my pointer right
21 now. And then the rest of the system is filled with
22 condensate grade water.

23 DR. WALLIS: So it'll stop. It's got
24 enough water in it to get going when it needs to get
25 going.

1 MR. BEARD: Right. So I have the entire
2 static CAD coming down from there full of water at all
3 times. I do have steam up here. There will be some
4 condensation because I'm losing heat out through the
5 shell of the pipe. The pipes are pitched so that we
6 do have drain back. Also, to address the concern
7 about accumulation of non-condensable gases,
8 specifically hydrogen, we do have a vent pipe that is
9 attached to the upper points of this header pipe.
10 It's a nominal three-quarter one-inch pipe, comes down
11 and is continuously vented to the main steam line.
12 The way we're able to do that is on the nozzles we
13 have a flow venturi that establishes basically a 40-
14 pound pressure drop across that venturi. The steam
15 line here is on a stub tube that does not have a
16 venturi device, and even if it did, there is no flow
17 here normally, so there's a 40-pound difference
18 between the steam inlet here and the steam pressure
19 here, so we're able to continuously sweep that pipe
20 for the non-condensable gases that might --

21 DR. WALLIS: You don't need much flow at
22 all.

23 MR. BEARD: You don't. No, like I said,
24 it's about a one-inch line, and there's even an
25 orifice built into it.

1 MR. SIEBER: Is the flow large enough to
2 control the chemistry in those lines?

3 MR. BEARD: There is no flow in this
4 portion of piping.

5 MR. SIEBER: Okay.

6 MR. BEARD: But it's also all stainless
7 anecano tubing.

8 MR. SIEBER: Anecano. Okay.

9 MR. BEARD: Were there any questions on
10 that? I should go back, I'm sorry. I mean, it's all
11 -- in this case, you're sitting in a body of water
12 that's nominal 100 degrees Fahrenheit, and that's what
13 the water -- the temperature of that water will be
14 until we initiate it. When it comes time for the IC
15 to go into operation, the isolation valves in hot
16 standby are kept open. The only thing preventing the
17 system from operating is these two parallel, what we
18 call condensate return valves. We command both of
19 those to go open and the water starts to drain in
20 here, start uncovering tubes, and we start to get a
21 rapid condensation of the steam that's entering into
22 that tube area. In fact, it is so rapid that we have
23 to slow down the opening of these valves to make sure
24 that the amount of cold surface that we expose is done
25 in a regulated manner to make sure that we don't have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 steam or water hammer issues.

2 DR. WALLIS: So how do those valves open,
3 by what mechanism?

4 MR. BEARD: Well, that's a good question.
5 NO stands for nitrogen operated. It's a pneumatic
6 piston assembly. Those four valves, because there's
7 one of these for each of the flow isolation
8 condensers, are actually set up such that should they
9 lose either pneumatic pressure or the electrical
10 signal to the cellanoid, they will fail into
11 operation. The valve will stroke open. The other
12 valve is just a safety-related electrical MOV that you
13 would send the signal to and command the valve to go
14 to the open position.

15 NMR stands for nitrogen motor operated.
16 We have some diversity here, as well, to make sure
17 that if we need to, we can isolate that.

18 MR. SIEBER: How do you control the valve
19 speed, with a snubber?

20 MR. BEARD: Yes, some sort of hydraulic --

21

22 MR. SIEBER: On the stem.

23 MR. BEARD: Yes.

24 MR. SIEBER: Okay.

25 MR. BEARD: Well, it could be that, or it

1 could be metering off the pressure of the air. I
2 don't want to commit to whether it's pneumatic or
3 hydraulic.

4 MR. SIEBER: So you don't know.

5 MR. BEARD: I fully suspect that it's
6 going to be a hydraulic ash pot, but there is a
7 possibility it could be a meter into --

8 MR. SIEBER: Okay. Thanks.

9 MR. BEARD: Passive containment cooling -
10 as I said before, we have six passive PCC heat
11 exchangers. They operate in medium and large break
12 LOCAs. We say they provide backup to the ICs, if
13 needed. The way they provide that is we depressurize
14 the vessel. In fact, it becomes a LOCA when we open
15 the depressurization valves, so we have steam in the
16 dry well and the PCCs, we're moving the decay heat
17 from the containment. They are entirely passive.
18 There is no valves on the entire system, nothing needs
19 to be repositioned for them to go into operation. We
20 only need steam in the dry well in order for them to
21 start operating removing heat.

22 Forty-hours worth of demineralized water -
23 that was those teal-colored bodies of water I showed
24 you, to get beyond. To get out to 72 hours, I only
25 need to open one of the four valves up on the floor to

1 allow the water, that darker blue water to circulate
2 out into the heat exchanger compartments.

3 Graphically, we have a steam environment
4 now in the dry well. As I said, the initial 30-40
5 seconds of blow down is handled by the suppression
6 pool. All of the PCCs are doing some amount, but
7 after the initial blow down starts to tail off, PCCs
8 of steam enters up through the central pipe. It is
9 distributed out to the headers. They fill the pipes,
10 condense the water. Water is collected and then it is
11 returned back to the GDCS pools. There is a loop seal
12 on that pipe to make sure that we don't ever have an
13 attempt to introduce steam back up the opposite way.

14
15 To address the issue of non-condensable
16 gases building up in the PCC, and degrading the heat
17 transfer, we have a continuously open vent line. And
18 what happens here is, you can see that the submergence
19 of that sparger on the end of the vent line is less
20 than the upper level events, so as my decay heat
21 capacity removal starts to decay in here because of
22 the build-up of non-condensibles, pressure in the dry
23 well will start to increase. I will start
24 depressurizing the water column, and at the point that
25 the pressure is equal to the submergence here, I will

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 uncover that, and I will blow a combination of steam
2 and non-condensable gases through that sparger. The
3 steam, obviously, will be condensed by the water, non-
4 condensable gases will be accumulated in the wet well
5 air space.

6 DR. RANSOM: Is that one valve you had
7 open shown there between the IC and the --

8 MR. BEARD: No.

9 DR. RANSOM: That's not it.

10 MR. BEARD: I can go back. There are two
11 connections here, two connections here, each one of
12 those has a valve on it. At 40-hours, I only need
13 half -- no more than half of these, so any one of
14 those four valves opening is going to ensure that I
15 can get out to 72 hours.

16 DR. RANSOM: Well, what is that, dark blue
17 is sitting up on the roof, too?

18 MR. BEARD: That dark blue is the water
19 that's in the RPV cavity in the equipment pool. The
20 reason for that is, this is demineralized grade water,
21 this is condensate grade water. Same chemical
22 constituencies, but there is no levels of radioactive
23 contamination in the condensate, so during normal
24 operation we don't want the bodies of water mixing.

25 DR. WALLIS: Now is this non-condensable

1 vent line - why doesn't that take condensate, as well?

2 MR. BEARD: It will. There will be steam
3 that comes out.

4 DR. WALLIS: And condensate, and water,
5 too.

6 MR. BEARD: Well, actually it would be
7 more -- I don't know that that's graphically correct.
8 It probably taps off on the vertical leg.

9 DR. WALLIS: I think something of it's --

10 DR. RANSOM: They have a separator in --

11 DR. WALLIS: Something that's not exact
12 about the drawing, perhaps. It looks as if the
13 condenser --

14 MR. BEARD: Probably, we ought to have
15 these pipes switched around.

16 DR. WALLIS: Drain down into the sparger
17 instead of going to the condensate drain lines.

18 MR. BEARD: Yes, I think we need to have
19 these pipes switched around.

20 DR. WALLIS: Something doesn't look right.

21 MR. WACHOWIAK: Those dotted lines
22 indicate that the vent pipes go to the top and --

23 DR. WALLIS: They go inside. Okay. Thank
24 you.

25 MR. BEARD: Thank you, Rick. Rick

1 Wachowiak says those dotted lines indicate that the
2 vent pipes extend all the way up into that lower drum.

3 DR. WALLIS: That's clearer now. Thank
4 you.

5 MR. BEARD: Emergency core cooling -
6 talked about how we have three GDCS pools that contain
7 approximately 1,700 cubic meters of water, 264 gallons
8 of water to a cubic meter if you want to do the math.
9 There are four trains of GDCS. Much like most of our
10 centralated systems, we do have four trains. In order
11 for the GDCS to work, we have to have a depressurized
12 reactor pressure vessel. If we have a large break
13 LOCA, that's going to do it for us. If we don't have
14 a large break LOCA, if we have a small break LOCA or
15 the isolation condensers fail to operate, we need to
16 depressurize the RPV. How do we do that? It's
17 actually two stages.

18 The initial depressurization of the vessel
19 is done just like we do on our existing plants. We
20 open up designated safety relief valves to provide the
21 initial depressurization, the steam is exhausted from
22 those safety relief valves out through tail pipes into
23 quenchers that are located at the bottom of the
24 suppression pool condensing the steam that goes out
25 that. Through that we'll get down to about nominally

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 a 20-pound pressure in the reactor pressure vessel.
2 At that point, we have eight Squib actuated
3 depressurization valves that will be fired to go ahead
4 vent the steam directly out into the dry well air
5 space, now equalizing the pressure in the RPV with
6 that in the dry well air space, and establishing
7 conditions where the GDCS can flow into the RPV.

8 DR. POWERS: And, again, how many of those
9 have to work?

10 MR. BEARD: From deterministic basis or
11 licensing basis, we say seven of the eight. They are
12 single failure proof. I think PRA has looked at it,
13 and is it five, three, five, we need five of the
14 eight.

15 MR. SIEBER: Are they of a size that
16 you've already manufactured with the Squib valve?

17 MR. BEARD: They are a size that we did do
18 a full test program on.

19 MR. SIEBER: Okay.

20 MR. BEARD: And they are smaller than the
21 ones used on other vendors' designs.

22 MR. SIEBER: Right.

23 MR. WACHOWIAK: This is Rick Wachowiak of
24 General Electric. In the deterministic analysis,
25 since they only need to look at a single failure, they

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 have evaluated it with seven of them opening. I don't
2 think they even looked at more than one failing. In
3 the probabalistic calculations, the input for the
4 probababilistic calculations, we can show that if
5 three of those valves open, we'll get sufficient GDCS
6 into the reactor to cool the core, so we set our
7 success criteria at four, one greater than that. So
8 if we have five failures, we'll consider that a
9 failure of the system.

10 MR. BEARD: And I should mention that on
11 those GDCS valves, they're Squib actuated. Each one
12 of those valves has two Squib charges, one of which
13 needs to fire to cause the valve to guillotine open.
14 I've already said this before, core does remain
15 covered for the entire range of design-basis
16 accidents. As long as I keep water over the top of
17 the fuel, I'm not going to have any core heat-up, so
18 we obviously comply with the requirements of 50.46.
19 The codes that we use to demonstrate that have been
20 approved by the NRC, TRACG, as Ralph was able to bail
21 me out. And the stored water contained inside the
22 containment is sufficient to always keep this flooded
23 up above top of active fuel.

24 GDCS has what we character as two modes,
25 actually three modes of operation. I'm only going to

1 talk about two. The third mode is to deal with the
2 severe accident scenario. The first mode is what we
3 call our short-term cooling mode; that is, as we see,
4 this is Division A, is typical of one of the four
5 divisions. There is a pipe from, in this case, the
6 two smaller GDCS pools, each have one connection. The
7 larger of the three GDCS pools has two of the trains
8 connected to it. Pipe comes out of that pool, comes
9 down, and then actually separates into two routes
10 attached to two different nozzles on the RPV. Each
11 one of those pipes has a check valve that has a biased
12 open check valve that's accomplished by magnetic
13 torque motor that keeps the valve slightly off its
14 back-seat position. It also allows us to exercise
15 that valve to make sure that it hasn't bound up. But
16 the actual flow into it is when we initiate or fire
17 the Squib charge, opens up the flow path, and then the
18 check valve is there just in case for whatever reason
19 we inadvertently fired that valve during power
20 operation. You won't get flow back out of the vessel,
21 or if there was some scenario where you had
22 repressurization of the vessel following the firing
23 the Squib, we again prevent back-flow through that.
24 So there are eight total of these injection paths.
25 Again, deterministically, we say seven are required

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 PRA. I forget how many he says are needed for
2 success, but it's significantly less than those eight.

3 Long term we have, again, four trains.
4 It's called the sequelizing line. The reason for this
5 is the PCCs over 72 hours or longer are going to have
6 a net transfer of condensate from the upper dry well,
7 the dry well region over the suppression pool. That's
8 happening because we have that operation of the vent.
9 There is going to be transfer of condensate again from
10 the dry well air space over to the wet well. So at
11 some point, the suppression pool here is going to
12 start to rise. The water level in the dry well is
13 going to start decreasing because I'm moving water
14 over there, constant volumes, and so at the point when
15 the water level in the suppression pool exceeds the
16 water level in the dry well, we can now open that
17 equalizing line, allow gravity to flow that water from
18 the suppression pool back into the dry well,
19 maintaining constant level within the containment
20 spaces.

21 DR. WALLIS: Now does this automatically
22 happen, or do you have to fire something?

23 MR. BEARD: Again, it is a Squib valve
24 that has to be fired.

25 DR. WALLIS: So there has to be some

1 sensor that tells you when these levels are just right
2 before you fire it?

3 MR. BEARD: There is sensor, and I think
4 there's also a timer on it that says at some point
5 even if we haven't detected it, we're going to go
6 ahead and do it. Part of that is, I don't have
7 prepared slides, much like the AP-1000, our control
8 and monitor function we only support with 24-hour
9 batteries. At 24 hours, we say we've gotten the plant
10 into a stable safe shutdown condition. We're going to
11 be able to monitor it for the next 48 hours, so we
12 would have to open that valve prior to losing the
13 electrical capability to open it. But again, I have
14 a check valve there. I will not have back-flow out
15 into the suppression pool, and my water levels will
16 stay equal. Even if I did have back-flow, they're
17 going to equalize out at some point.

18 DR. WALLIS: Say that again. You've got
19 a check valve in series with this?

20 MR. BEARD: Right there.

21 DR. WALLIS: Only allows flow into the
22 reactor.

23 MR. BEARD: Only flow into the reactor.

24 DR. RANSOM: At this point, the PCC pools
25 have dried out?

1 MR. BEARD: Which point, when this is
2 occurring?

3 DR. RANSOM: At the point that you would
4 open this bypass or equalizing line.

5 MR. BEARD: Opening that valve is entirely
6 independent of what's going on in the PCC/ICC pools.

7 DR. RANSOM: Why would you open it unless
8 you have dried out the cooling capability --

9 MR. BEARD: Like I said, the PCCs over
10 long-term operation are going to transfer condensate
11 from the dry well to the wet well, so the water level
12 in the dry well is going to start to depress, water
13 level in the suppression pool is going to come up. I
14 want to be able to equalize them out again.

15 DR. WALLIS: Actually, if the check valve
16 works, you don't really need that valve.

17 MR. BEARD: Well, except it's a high
18 pressure system.

19 DR. WALLIS: And you don't trust the check
20 valve.

21 MR. BEARD: No, not on a reactor coolant
22 pressure boundary I don't.

23 DR. WALLIS: No, you don't. Okay.

24 MR. BEARD: That was the end of my
25 prepared remarks. Rick Wachowiak is now going to give

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 you a brief overview of the PRA, and explain to you
2 how we get to that wonderfully low number.

3 MR. WACHOWIAK: All right. Once again, my
4 name is Rick Wachowiak, probabalistic risk assessment
5 lead for the GE ESBWR. So let's just quickly go
6 through an overview of what we've done for the PRA,
7 and what the results are.

8 For internal events, which would be any of
9 the LOCAs and transients, those sorts of things, with
10 power operation we've done a complete Level I accident
11 prevention, or core damage prevention; Level II,
12 severe accident mitigation, and Level III, off-site
13 consequence PRA. The Level III we had to use an
14 assumed site, since we don't actually in the DCD phase
15 you don't actually have a site to work with, but we
16 picked the bounding parameters.

17 For shutdown, we did an internal events
18 only PRA. However, we've gotten some feedback from
19 the Staff that said they would like to see more on the
20 external events, so we're in the process of getting
21 that information to them.

22 We did not do a Level II for the shutdown,
23 mainly because almost all of the shutdown core damage
24 frequency occurs in mode six, which is the refueling
25 mode, which there is no containment. So the

1 containment is open there, and there wasn't really
2 much reason to look at the containment for the other
3 modes.

4 External events non-seismic, we've done
5 screening analyses to show that the things like fire,
6 flooding, high winds don't introduce any new or
7 interesting phenomena that we haven't already
8 addressed in the internal events, and they don't
9 really impact the risk level for the plant. And for
10 seismic, we've done a seismic margins analysis on our
11 safety-related system. Once again, determined that
12 there really aren't any outliers there that would tend
13 to drive risk any different than what we would expect
14 by these other analyses.

15 DR. KRESS: Level II, did you use MAAP?

16 MR. WACHOWIAK: Where we used MAAP was for
17 determining the source terms for the off-site
18 consequences. For determining the phenomenological
19 probabilities, we used various combinations of CFD
20 calculations and other codes that were benchmarked
21 against experiments, like the IET test and various
22 things like that to determine the phenomenological
23 probabilities. So in terms of determining what's the
24 probability of a containment failure during a DCH
25 event, we did not use MAAP for that.

1 DR. KRESS: You used something like ROAM.

2 MR. WACHOWIAK: ROAM, yes, for that.

3 Where we used MAAP was in the other parts, where if we
4 did have one of these events, what is going to be the
5 source term that we would feed into the Level III PRA.

6 DR. KRESS: And Level III you use CRAAC?

7 MR. WACHOWIAK: MACCS.

8 DR. KRESS: MACCS.

9 DR. POWERS: When you use something like
10 ROAM, my recollection is that requires judgments on
11 distribution functions, for which nobody has any
12 physical experience, like the fraction of cladding
13 that's not oxidized in a core melt-down accident and
14 things like that. How do you come up with
15 distributions for things like that, usually for a
16 plant that's never been built, and certainly never
17 been melted down?

18 MR. WACHOWIAK: One of the things that we
19 did was we looked at previous ROAM applications for
20 things, such as the AP-1000, and instead of trying to
21 pick the entire distribution and work with the means
22 and other various convolutions of different
23 distributions, we picked parameters that were at the
24 end of the distribution. So we did all of our
25 analysis based on the high confidence values.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 DR. POWERS: Meaningless distribution is
2 -- taking the ends of a meaningless distribution is
3 still meaningless.

4 MR. WACHOWIAK: I understand, and the way
5 that the ROAAM process addresses that is by taking the
6 analysis and the results, and presenting it to several
7 different reviewers and addressing the comments
8 through expert opinion. That's how the process works,
9 and as we get into this, we can discuss more on the
10 process of the distributions that are used.

11 DR. POWERS: I bet we do.

12 MR. WACHOWIAK: Okay. I want to go over
13 a couple of definitions that we used in the process,
14 just so everybody's on the same page. For core
15 damage, it's defined as a peak clad temperature of
16 greater than 2200 degrees F. However, for the DCD
17 purposes, for certification purposes, we used core
18 uncovered as a surrogate for core damage, so we've got
19 some margin there. Exactly how much, we didn't
20 attempt to calculate that. So core uncovered is what
21 we used as our surrogate. For containment failures,
22 we included any failure of the containment and
23 uncontrolled release, and we also included any
24 containment venting into the large release category,
25 or into the -- yes, into the large release category.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 DR. KRESS: You looked at all containment
2 failures, like early and late, or did you --

3 MR. WACHOWIAK: We looked at early and
4 late. However, at this point, we haven't really made
5 any distinction between an early failure and a late
6 failure. We included all of them in our category.
7 Now one of the things we may want to look at as we go
8 forward with this, there are some of the containment
9 failure modes that are occurring very late, like out
10 in the third, fourth, fifth day, and we may not want
11 to call those venting releases on the fourth day. We
12 may not want to call that a containment failure.

13 DR. DENNING: Do you have any bypass
14 scenarios in which the passive systems are providing
15 the bypass route?

16 MR. WACHOWIAK: A sequence where the
17 containment or where the passive system itself is the
18 cause of the bypass? We've looked at that, and
19 determined that that would not be a significant --
20 anywhere near a significant fraction of the
21 containment failure probability, so we didn't
22 explicitly treat that.

23 DR. WALLIS: Are your PCT bigger than
24 2,200? That's for short-term transient, which you can
25 damage the core by holding it at lower temperatures

1 for a long time. Why is that not part of your
2 definition of core damage?

3 MR. WACHOWIAK: Once again, what we used
4 was in the ASME standard, that says that if you used
5 a detailed code for calculation, you can use 2,200.
6 If you used a less detailed code, you can use 1,800.
7 However, what we really did was we looked at core
8 uncovering, so we --

9 DR. WALLIS: There are other ways to
10 damage the core.

11 DR. DENNING: Yes, but you can't melt the
12 core down.

13 MR. WACHOWIAK: You can't melt the core if
14 it's covered.

15 DR. DENNING: I mean, you could damage
16 fuel, but you're not going to --

17 DR. WALLIS: You could damage the fuel,
18 right?

19 DR. DENNING: Yes, but the -- true. But
20 then you've got --

21 DR. WALLIS: You don't melt the core --

22 DR. DENNING: So you get some release of
23 radioactive material to the pool. I think it's --
24 melting fuel is important, I think.

25 DR. POWERS: You very seldom melt fuel in

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 any case. You liquify fuel.

2 DR. DENNING: Well, some eutectic liquid
3 formation or something.

4 DR. POWERS: You liquify fuel with a --
5 and it's not really a eutectic interaction.

6 MR. SIEBER: If you get to that
7 temperature, your plant is sort of messed up anyway.

8 MR. WACHOWIAK: It's probably recoverable.

9 DR. RANSOM: Core uncovered, is that a
10 collapsed liquid level?

11 MR. WACHOWIAK: What we've done to this
12 point, it's a collapsed liquid level.

13 DR. RANSOM: All right.

14 DR. WALLIS: Well, PWRs uncover for quite
15 a long time in a LOCA, don't they?

16 MR. WACHOWIAK: And as Alan pointed out,
17 the existing BWRs that are out there right now uncover
18 the core, a third of the core for quite a long time
19 during their design-basis analysis.

20 DR. POWERS: You have to be careful about
21 whether you're talking about collapsed level or not.

22 MR. WACHOWIAK: In our cases, we have been
23 using the collapsed level.

24 DR. POWERS: I got that impression. And
25 so you're not really --

1 MR. WACHOWIAK: We're not really
2 uncovering the core.

3 DR. WALLIS: So that's the only way you
4 can get any damage at all, is by having these very
5 conservative assumptions?

6 MR. WACHOWIAK: Well, that is one of the
7 advantages.

8 DR. DENNING: Well, he didn't really say
9 that. I mean, if you look at the situations in which
10 you do get the water level below the top of the core,
11 it could be in those situations, it's going to be well
12 below the top of the core. I mean, we just don't know
13 the answer.

14 MR. WACHOWIAK: And you don't know the
15 timing either, so in my estimation, we probably would
16 not change the core damage frequency by very much if
17 we went to the trouble to use very sophisticated
18 computer codes with a lot of other analyses to show.
19 But as we get to where the results are, we'll see what
20 it takes to get to core uncovered, will probably
21 proceed beyond core uncovering.

22 We did include a comprehensive systems
23 analysis in this PRA. Someone asked earlier about if
24 we included the non-safety systems. Yes, we did. We
25 included 24 systems which included both the safety-

1 related front line systems, the non-safety-related
2 front line systems, the ones that actually provide
3 cooling to the core, and also any support systems that
4 would be needed to keep those other front line systems
5 working; included all major components, and we had
6 fully linked support systems, which means it's the
7 full fault tree model all the way down to the
8 components in the support systems; included intra-
9 system common cause as most PRAs do. However, for
10 Squib valves, we did include an intra-system common
11 cause on the Squib valves for systems where we might
12 use the Squib valve in more than one application,
13 because it is so important to our passive safety
14 systems.

15 MR. SIEBER: Do you have any components
16 that are new enough in design concept that you really
17 don't have failure data for? And what did you do?

18 MR. WACHOWIAK: Well, new enough in
19 concept or in magnitude that the data doesn't apply,
20 and we don't think we're at that point. The Squib
21 valves that we have in the GDCS system are just
22 slightly bigger than the Squib valves that are now
23 being used in the standby liquid control systems of
24 other BWRs. The closest thing we might have is the
25 DPV-type depressurization valve, Squib valve there,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 and we have tests that we've done with that type of
2 valve.

3 MR. SIEBER: Okay. Everything else is
4 common stuff, like heat exchangers, pipes, check
5 valves.

6 MR. WACHOWIAK: Right.

7 DR. DENNING: Well, I think there's an
8 important thing we have to worry about though, Jack,
9 and that is, you're taking a lot of credit for passive
10 systems, and we have to really be sure that those
11 passive systems really function for all the various
12 conditions that maybe we haven't thought about.

13 MR. SIEBER: Yes, they're driven by pretty
14 small DPs sometimes, and you're counting on a certain
15 flow rate which you may not achieve. Understood.

16 MR. WACHOWIAK: Yes. And in some cases,
17 there's a big DP, other cases as you move out along
18 the time curve, the DPS get less. We're also moving
19 farther and farther away from the capacity that we
20 have. I'm sure we'll get into that discussion. We've
21 already started that discussion with the Staff.

22 MR. SIEBER: Of course, on the other hand,
23 the energy that you need to dissipate is getting
24 lower, and lower, and lower.

25 MR. WACHOWIAK: As time moves on.

1 MR. SIEBER: As all these driving forces
2 are getting smaller.

3 MR. WACHOWIAK: That's correct. For our
4 containment performance, for any systems level or any
5 systems information that needs to be passed forward
6 into the containment analysis, we've directly linked
7 the Level I and the Level II, so we don't have that
8 arbitrary interface that some PRAs have. And as we
9 mentioned earlier, for determining the phenomena
10 probability, such as what's the probability that we're
11 going to fail the containment during a DCH or things
12 like that, we used the ROAAM process, and used the
13 high confidence rather than mean values when we did
14 that evaluation, or those evaluations.

15 We talked a little bit about data a second
16 ago. I just want to point out a few things about our
17 data. Our initiating events are all based on the
18 operating fleet, so we took NUREG 57.50, and looked at
19 that. So we didn't try to incorporate some of these
20 new features that we have in the feedwater system that
21 Alan was talking about, where we think it's much more
22 reliable, better than what's out there in the fleet
23 now. So we did not incorporate those types of things
24 into our initiating events, anything that was better.
25 Some things we did take out, if we really knew that

1 there wasn't a failure mode there any more. We took
2 those out.

3 Generic data we picked from the URD for
4 the most part, the EPRI requirements document.
5 However, we did adjust for things like environmental
6 conditions for the check valves, and GDCS valves that
7 are now going to be operating in possibly a steam
8 environment or a high temperature environment, versus
9 right now the Squib valves that we see in standby
10 liquid control. The environment is different, so we
11 increased the failure rates for those sorts of things.
12 We also looked at long test intervals.

13 DR. WALLIS: How do you do that? These
14 are just guessing that it's going to be twice as bad,
15 or do you have some rational basis for deciding when
16 you change the environment, how this failure rate will
17 change?

18 MR. WACHOWIAK: We used a guess, and then
19 we performed sensitivity analyses to show that it
20 wasn't important.

21 DR. WALLIS: That's not a very secure way
22 of doing things.

23 MR. SIEBER: Best you got here.

24 MR. WACHOWIAK: And a guess followed up by
25 sensitivity analyses.

1 DR. WALLIS: Because, I mean, it might be
2 that the steam environment does something drastic to
3 some kind of --

4 mR. WACHOWIAK: Well, they're qualified
5 for operating in that condition, so we're starting
6 with something that's qualified to operate in that
7 steam condition, but we're looking at data that was
8 not taken in that same scenario.

9 DR. WALLIS: You didn't have to use a
10 guess, so I --

11 mR. WACHOWIAK: It would be better. We've
12 also adjusted things for long test intervals. Most of
13 the data that's in the URD is associated with
14 equipment that's tested quarterly. Since we have some
15 valves that are in locations that we won't see for two
16 years, because they're inside of the containment, and
17 that would be the refueling cycle, we adjusted the
18 failure rates to account for the longer test interval.
19 And with that, we used a method that - I don't
20 remember the name of the method, but it's a method
21 that's typically used for adjusting data for longer
22 test intervals. Yes, a structured guess. I don't --
23 it's a process that's been used in other PRAs for
24 adjusting data for that.

25 DR. WALLIS: It probably actually has an

1 equation that goes with it.

2 MR. WACHOWIAK: Yes, it does. We also, in
3 looking at operator actions in the design
4 certification, we've used screening values where we
5 think the lower bound reliability for our operators,
6 and we tried to use a rule of thumb, things such as if
7 the action had to be taken very early, like in the
8 first 30 minutes, we wouldn't count on the operator.
9 If it had to happen in the first hour, we'd give him
10 some credit, in the first day a little bit more
11 credit, out after the first day a little bit more
12 credit beyond that, but there's still screening
13 values.

14 DR. WALLIS: But the reliability of the
15 operator actions is pretty high, isn't it here, the
16 probability of the wrong action is 1 percent or
17 something typically, isn't it?

18 MR. WACHOWIAK: For actions that would
19 need to be taken between one hour and 24 hours, 1
20 percent is approximately the value that we use.

21 DR. WALLIS: That's all right if the
22 operator really knows what's going on, but if he
23 misunderstands the accident, then he can do all kinds
24 of things. If he misunderstands what's happening,
25 he's much more likely to cause an error than him

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 actually knowing everything and doing the wrong thing.
2 It's when something happens to confuse them in the
3 context --

4 MR. SIEBER: Yes, but with a passive
5 system there isn't too much for the operator to really
6 screw up.

7 DR. DENNING: He might screw up the
8 passive system. That's the --

9 MR. SIEBER: Yes, but that would be a
10 mispositioned valve or something like that.

11 MR. WACHOWIAK: And I want to be clear on
12 what we did with the operator actions for post
13 accident. We've included the types of things where
14 the passive, or the automatic systems didn't work, and
15 the operator is backing up that automatic system.
16 We've included those errors. We did not include
17 errors of commission as other PRAs that are done for
18 nuclear power plants.

19 DR. POWERS: But, I mean, how can you not
20 do that? I mean, that seems to be the downside of
21 having a hands-off accident scenario where your
22 operators don't have to do anything. The truth of the
23 matter is the operators will do something. I mean,
24 that is in their nature to do stuff, and I don't know
25 how you come up with a 1 percent error rate on errors

1 of commission. I mean, I have no idea how to do the
2 estimate.

3 DR. WALLIS: I think what you have to do,
4 make it very difficult to do that, and make it so that
5 the system is -- you can't interfere with it once it's
6 -- gravity is working. You cannot do something to
7 screw it up.

8 MR. WACHOWIAK: So, for example, we do
9 have an example of that in our safety systems. In the
10 combination of ADS GDCS, once that goes into its
11 operation, it can't be overridden by the operators. It
12 continues to its full -- once it's been activated,
13 automatically it continues to its completion.

14 DR. WALLIS: You can't cut-off the Squib
15 valve or something.

16 MR. WACHOWIAK: Right. And we've set it
17 up so that you -- so we've attempted to address that
18 in the design, but once again, as other PRAs for
19 nuclear power plants, we have not fully addressed the
20 errors of commission issue.

21 DR. WALLIS: That's errors of commission
22 by the designer.

23 DR. SHACK: You have to remember, these
24 aren't real numbers. I mean, this just demonstrates
25 that you've got lots of redundancy in this --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 DR. WALLIS: You're telling me PRAs are
2 not real numbers. Is that what you're claiming?

3 DR. SHACK: Three times ten to the minus
4 eight.

5 MR. WACHOWIAK: What we wanted to show in
6 the end --

7 DR. WALLIS: When you're down to design
8 here, then it means a design fault could be the
9 limiting factor on PRA, if there's something which you
10 overlooked in the design. I don't know if it's a ten
11 to the minus six probability of that, but there must
12 be some probability of that.

13 MR. WACHOWIAK: And, as a matter of fact,
14 we have included that in some of the areas, especially
15 in the digital instrument and control area, we've
16 looked at design errors in the software systems, so
17 those we've included in the analysis.

18 What we wanted to show with our data
19 values is that the low CDF we have with the ESBWR is
20 due to the design, the redundancy and diversity in the
21 design, and not a direct consequence of just saying
22 it's a new plant so we have better numbers.

23 DR. WALLIS: I'm thinking about design is
24 using degrees Centigrade instead of Fahrenheit, and
25 sizing a -- somehow it slips through everything,

1 nobody catches it. Some engineer calculates the pipe
2 size and everything seems right, and the computer
3 calculates it right because something is wrong about
4 that, but in fact, it's passed all the inspection and
5 still the wrong size.

6 MR. WACHOWIAK: Somebody signed when they
7 should have co-signed, right.

8 DR. WALLIS: Whatever.

9 MR. WACHOWIAK: But certainly those are
10 below ten to the minus eight.

11 DR. WALLIS: Wait a minute.

12 MR. WACHOWIAK: Those types of things have
13 not been treated in past PRA applications like this,
14 and we're trying to -- our attempt it to do this at
15 the, what we call the state-of-the-art, what's being
16 approved.

17 DR. WALLIS: But then you're going to tell
18 me that an error in TRACG is likely with a factor
19 probability ten to the minus -- don't tell me that.

20 DR. SHACK: You could have left off the
21 decimal point.

22 MR. WACHOWIAK: On this one? Well, I did
23 as I moved down to the next one, I left them off.

24 DR. POWERS: You were very proud of that
25 point, too. You had to work hard to get that --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. SIEBER: I take it external events is
2 seismic, fire.

3 MR. WACHOWIAK: Seismic, fire, flood.

4 MR. SIEBER: Flood. You actually analyze
5 those or are you just saying --

6 MR. WACHOWIAK: Okay. What we did, I
7 mentioned that on the first slide, for the flood
8 analysis, that was as close to actual -- the details
9 in the internal events PRA of any of the external
10 events screening analyses that we did. We came up
11 with a very low number there. It shows about in this
12 decimal point out here, so that's low.

13 When we looked at fire, we looked at it in
14 a very conservative manner with very bounding
15 assumptions and found that fire itself, those
16 scenarios don't come anywhere near -- with the
17 bounding assumptions, they're out here, so they don't
18 have a large contribution.

19 MR. SIEBER: Yes, you don't have too many
20 things that have to operate.

21 MR. WACHOWIAK: Don't have too many things
22 that have to operate, and plus --

23 MR. SIEBER: Since fire doesn't have much
24 of an impact.

25 MR. WACHOWIAK: That's correct. And the

1 other thing that's happening here is that we now know
2 when we're building this plant what the right way to
3 design for electrical separation for fires is, versus
4 previous plants that were built or designed 50-60
5 years ago, or whenever they were designed, they didn't
6 have the advantage we have now of knowing how to
7 prevent fire interactions.

8 MR. SIEBER: Now the seismic, if I read
9 properly, it's designed for a hard rock site southeast
10 or better?

11 MR. WACHOWIAK: Central, yes.

12 DR. DENNING: But they did a margin study
13 instead of a seismic PRA, so they don't know what --

14 MR. SIEBER: Okay. So you don't really
15 know.

16 MR. WACHOWIAK: Don't really know.

17 DR. DENNING: You didn't --

18 MR. SIEBER: That's the design basis. You
19 have to find a site that's like that.

20 MR. WACHOWIAK: We did it based on the
21 likely customers that we'll see shortly here.

22 DR. WALLIS: How much did you adjust this
23 for the fact that this thing has never been built?

24 DR. DENNING: You take it for what it's
25 worth. And what it's worth is, it says they did a

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 very good job of designing this system, and that's
2 what you believe, and you don't believe it's ten to
3 the minus eight --

4 DR. WALLIS: It's not practice, it's
5 design.

6 DR. DENNING: Right. And give a question
7 about you did a sensitivity study where you only
8 credited Class I systems. I don't see it in here, but
9 I saw it in something else.

10 MR. WACHOWIAK: Right.

11 DR. DENNING: And the results of that was?

12 MR. WACHOWIAK: When we only credited our
13 safety-related systems and what we calling our RTNSS
14 systems, the Regulatory Treatment of Non-Safety
15 Systems, when we included those, the CDF was somewhere
16 around ten to the minus five, four times ten to the
17 minus five.

18 DR. DENNING: I think it was about -- I
19 wanted to point out that it doesn't satisfy Mary
20 Druin's criteria, believe it or not.

21 MR. WACHOWIAK: Because it's not better
22 than existing plants?

23 DR. DENNING: No, it's that she wants ten
24 to the minus five, but only with safety class --

25 MR. SIEBER: At least one of the members

1 objects to that criterion.

2 DR. DENNING: Yes, well at least one. I'm
3 pointing that out, not to say --

4 MR. WACHOWIAK: Is that in a published
5 memo somewhere?

6 DR. DENNING: It's nothing official.

7 MR. WACHOWIAK: Okay.

8 DR. DENNING: It's just part of the
9 process of developing technology neutral and various
10 concepts people are thinking of.

11 MR. WACHOWIAK: Okay. That's good to
12 know.

13 DR. DENNING: But don't change your design
14 as a result of it.

15 DR. WALLIS: We talked about this earlier,
16 but when you only consider safety systems, you get a
17 pretty high -- you get a factor of ten to the fourth
18 difference when you --

19 MR. WACHOWIAK: Well, let's put everything
20 on an even --

21 DR. WALLIS: Is it fair --

22 MR. WACHOWIAK: -- on a level playing
23 field here. If you take an existing BWR today that
24 has a calculated core damage frequency of ten to the
25 minus six and eliminate all the non-safety systems

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 from that, they're not going to be anywhere near ten
2 to the minus four, so the PRA analysis is meant to
3 look at all the different things that you have
4 available to you, and the numbers are based on that,
5 and the goals are based on that.

6 SPEAKER: Just one comment, Rich. That
7 was not the CDF that Mary was -- it was meet the
8 safety goals with safety-related equipment doesn't
9 imply that needs to be ten to the minus five core
10 damage frequency.

11 DR. WALLIS: Well, I'm just puzzled. Why
12 do you bother to call anything a safety system if you
13 don't need it in the PRA? It doesn't matter what it
14 is in the PRA. Why do you bother to have a Class I if
15 it's -- what's the difference? Why have it?

16 MR. WACHOWIAK: It's being directed by
17 different sets of regulations.

18 DR. WALLIS: Why? The PRA is the bottom
19 line, who cares?

20 DR. POWERS: When the regulations were
21 written, the PRAs were only not a bottom line, they
22 didn't actually exist.

23 DR. WALLIS: Today is today. I'm just
24 asking why today if the PRA is the great measure of
25 everything, you would want to have the different

1 classifications. It doesn't seem to make so much
2 sense as it used to in the old days.

3 DR. SHACK: From your old U-Graph it's
4 three times ten to the minus eight for the base case
5 safety, plus RTNSS is four times ten to the minus
6 five. No operator credit is two times ten to the
7 minus six. Multiply the Squib failure by five, it's
8 one times ten to the minus seven. The Squib failure
9 by ten is three times ten to the minus seven.

10 DR. WALLIS: Well, when you have all these
11 different numbers, what's the basis for making a
12 decision?

13 DR. POWERS: Ten to the minus seven, ten
14 to the minus eight, and ten to the minus nine are all
15 the same numbers in PRAs. There aren't different
16 numbers.

17 SPEAKER: Well, I think if you can make it
18 low enough, you don't have to worry about safety
19 culture is the --

20 SPEAKER: No, if you make it low enough,
21 that's all you have to worry about.

22 MR. SIEBER: If it's low enough, it's hard
23 to make a change under 1.174.

24 DR. WALLIS: Well, to bring up Rich's
25 point, if you make it zero, then something else --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 SPEAKER: You could build another reactor
2 and still call it a small change.

3 DR. WALLIS: You can make it zero, and
4 something else like security becomes your dominant
5 safety consideration.

6 MR. WACHOWIAK: Right. And one of the
7 things that we wanted to do for this whole design
8 process is we wanted to take the experience that we've
9 had from doing risk analyses on existing plants and
10 apply it early in the process of the design, so what
11 we've tried to do is we tried to eliminate those
12 things that were causing risk-significant problems in
13 other plants. And the calculated value comes down
14 because the things that we've identified as problems
15 before are designed out of this plant. They're not
16 there to cause us problems any more.

17 DR. SHACK: Why are there dents in the
18 bottom of your vessel?

19 MR. WACHOWIAK: Why are there dents?

20 DR. SHACK: Is that where you drop --

21 MR. WACHOWIAK: I think that's where they
22 did the ASME stamp on the --

23 DR. SHACK: Why do you guys always leave
24 out that forest that's really at the bottom?

25 MR. WACHOWIAK: I wanted to point out a

1 couple of things here that possibly Alan didn't hit in
2 his other presentation, just for the containment
3 highlights. One, he talked about it finally in the
4 end, is this deluge line, that if we were to happen to
5 get the core out of the vessel, how do we keep water
6 on there, and we'll talk about that a little bit more
7 in the next slide.

8 The other thing that wasn't really talked
9 about yet was this, what we call the MCOPS, or Manual
10 Containment Over-Pressurization System. It's really
11 part of our containment inerting system, but in the
12 event that everything fails, failure mode on something
13 that has no failure modes and things like that, we
14 still have the capability to reduce the amount of non-
15 condensibles in the containment, and keep it from
16 getting to an uncontrolled release.

17 DR. WALLIS: So what happens with that
18 hole there, what do you do with that hole?

19 MR. WACHOWIAK: It's not really a hole.
20 It's the Containment Inerting System. There's a 12-
21 inch pipe that's used to actually inert the
22 containment during things, so you could open that big
23 valve if you needed to. But in our cases, really what
24 we would use is the normal operational vent line which
25 is a 2-inch line, because if we vent off non-

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 condensible gases over a long period of time, the
2 containment strength is still such that --

3 DR. WALLIS: Is that line now part of your
4 pressure containment system, is that part of the
5 containment, that line?

6 MR. WACHOWIAK: Yes, and it always has
7 been.

8 DR. WALLIS: Out to the valve.

9 MR. WACHOWIAK: Out to the valve. And
10 we've specified from the valve to the stack it needs
11 to be able to handle severe accident conditions.

12 DR. KRESS: I'm glad to see you don't have
13 a sump with a screen.

14 DR. WALLIS: That's what that red dotted
15 line is.

16 MR. WACHOWIAK: That we don't have a what?

17 DR. KRESS: Sump.

18 MR. WACHOWIAK: Yes, well there is an
19 equipment drain sump, but not the sump that you're
20 talking about.

21 DR. KRESS: No recirculation.

22 MR. WACHOWIAK: No.

23 MR. SIEBER: Well, there is, but it's --

24 mR. WACHOWIAK: Well, the sump is up here.

25 DR. WALLIS: Well, let's talk about

1 debris.

2 MR. WACHOWIAK: Okay.

3 DR. WALLIS: When you have this big break,
4 where does all the debris go? Does it go into the
5 suppression pool, does it go through the vents, is
6 there chance that the debris will get up into those
7 condensers and block them up?

8 MR. WACHOWIAK: We have --

9 DR. WALLIS: What happens to all the
10 debris, which is flying around with a large LOCA?

11 MR. WACHOWIAK: The insulation that we use
12 on the vessel itself is the reflective metal-type of
13 containment or of insulation, which we wouldn't expect
14 to provide very much debris.

15 DR. WALLIS: If it does, it's pretty
16 robust; if it gets in a hole it can block it up.

17 MR. WACHOWIAK: We have screens keeping
18 debris out of the GDCS pool, and the inlet to the PCCS
19 heat exchanger is also protected, I believe, from
20 debris, so we've looked at those sorts of things. The
21 equalizing line does have a debris screen on it, but
22 once again, we wouldn't expect a lot of debris to be
23 coming through here, but it might.

24 DR. WALLIS: It might go down into that
25 well there.

1 MR. WACHOWIAK: Into the well here, but as
2 long as it's not out here, we're okay.

3 DR. WALLIS: So there is a consideration
4 of debris in the safety evaluation at this plant? I
5 think there has to be.

6 MR. WACHOWIAK: In the design, yes.

7 DR. WALLIS: Well, in the safety
8 evaluation, too. Is there at least a discussion or an
9 analysis of what happens to the debris? It's nice to
10 know it's all reflective metal.

11 MR. WACHOWIAK: Those deluge lines, what
12 they actually go down to is this device we call the
13 BiMAC, Base Mat Internal Melt Arrest and Coolability.
14 It's a type of core catcher that's actually built into
15 the floor of the lower dry well. The way that it
16 works is that if we were to get core material down
17 into here, this actually, it is built this way so that
18 it has a cup, if you will. The lid is just a walking
19 surface, it's not any sort of barrier. Yes, so you
20 could walk on the corium, is that -- so once we detect
21 that we have core material down there based on thermal
22 couples embedded in the material down here, we would
23 open this line, and any water that's in the GDCS pools
24 would come down through and be distributed amongst
25 pipes that are laid out parallel covering the entire

1 floor, spill out over onto the top, which would then
2 cool the core from the bottom, from the sides if it
3 gets there, and to the top, and then there's also
4 provision made so that after a few hours when the
5 water is gone, it can go into a natural circulation
6 mode.

7 DR. POWERS: Have you just been paid off
8 by the people doing steam explosion research? Is that
9 --

10 mR. WACHOWIAK: What's that?

11 DR. POWERS: Have you just been bought off
12 by the people doing steam explosion research? Is that
13 why you put this water in there?

14 MR. WACHOWIAK: Have we been bought off by
15 them?

16 DR. POWERS: Yes.

17 DR. KRESS: They want to do some more.

18 DR. POWERS: Yes, they want to do a lot
19 more here.

20 MR. WACHOWIAK: Okay.

21 DR. POWERS: They've got alternate contact
22 modes, they've got embedded wire injection. They've
23 got all the modes here.

24 SPEAKER: Well, I'm sure ROAM came up and
25 said it was wonderful.

1 MR. WACHOWIAK: We looked at the
2 possibility of steam explosions from inside these
3 pipes. That's been looked at. I don't know that we
4 included that part in the report, but that question
5 did come up, and we've looked at that. The heat
6 transfer rate that's going on through here into the
7 different sections is low enough where we wouldn't
8 expect that to be a problem.

9 DR. POWERS: I'll remind you that at the
10 Beta facility in Germany, they also did that
11 calculation, and we stunned to discover that maybe
12 calculations aren't 100 percent accurate.

13 MR. WACHOWIAK: And that was the specific
14 test we were talking about.

15 DR. WALLIS: With all that water there's
16 no recriticality?

17 DR. POWERS: Not when it's all --

18 MR. WACHOWIAK: No, not in this geometry,
19 and plus there's probably a lot of -- if you've melted
20 that much core to get down there, too, you've melted
21 as much control rod in addition to that. Plus, we
22 have the standby liquid control that's been injected
23 earlier on.

24 DR. POWERS: See now, if you melted the
25 boron and it oxidizes into boric acid which boils at

1 1830 Kelvin, and the core melts - how much boron do
2 you have left in this core?

3 DR. WALLIS: Boil after the control rods?

4 DR. DENNING: It's not needed for the
5 criticality. I mean, you have to have an optimum
6 configuration with this enrichment.

7 MR. WACHOWIAK: It's not the one we want
8 to see, I'll tell you that much.

9 DR. POWERS: Not a good fueling plant at
10 all.

11 MR. WACHOWIAK: I'm trying to think. One
12 of the questions that we didn't get to here that I
13 would have thought of, how do we have water still in
14 the GDCS pools if we're going to use it for this? The
15 main reason is, if we've used the GDCS pools to put
16 the water in the vessel, you don't melt the core. The
17 only way to melt the core is to keep the GDCS out of
18 the vessel.

19 DR. WALLIS: Isn't there going to be water
20 down there anyway?

21 MR. WACHOWIAK: No.

22 DR. WALLIS: No?

23 MR. WACHOWIAK: Because of steam
24 explosions in this area when the core comes out of the
25 vessel, we've done the best we can of avoiding having

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 a large or a deep pool of water in the lower dry well
2 before the core comes out of the vessel. There are a
3 few accidents that have -- maybe are calculated 1
4 percent or less of our severe accident, start out with
5 a large pool of water down here.

6 DR. WALLIS: I'm confused. I thought you
7 said that in these accidents the hole at the bottom of
8 the containment filled up with water.

9 MR. WACHOWIAK: Okay. In our design-basis
10 evaluation accidents, so if we have an accident where
11 we're looking at a pipe break of one of these lower
12 pipes - yes, that will happen. However, as we know
13 from doing PRAs for many, many years, pipe break
14 scenarios aren't the ones that drive risk. It's other
15 scenarios that drive risk, so most -- the vast
16 majority of our sequences that lead to a core damage
17 event have very little water down here.

18 DR. WALLIS: It's dry down there.

19 MR. WACHOWIAK: It's dry down here, and
20 we've done what we can to ensure that it's dry down
21 there just so that we can avoid the steam explosion.

22 DR. WALLIS: That's why there's still
23 water in the --

24 mR. WACHOWIAK: That's why there's still
25 water in the GDCS.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 DR. POWERS: Well, even if you had an ex-
2 vessel steam explosion, what in the world could it
3 possibly do to you?

4 MR. WACHOWIAK: We'll touch on that in a
5 one-liner at the end, but I'll just bring it up now.
6 We'll get there quickly. I think I'm close to done.

7 Okay. One last thing I want to talk about
8 during shutdown, if we were in the refueling mode,
9 that's why the head is gone now and there's water up
10 here, and we were to have some sort of an event that
11 caused a LOCA in the shutdown, the reason that the
12 shutdown core damage frequency is very low is that
13 when we dump the water that's already up here and
14 what's in the GDCS pools in, we end up filling the
15 containment all the way up this high. You end up --
16 it takes days to melt the core in a shutdown event
17 where we have some sort of loss of integrity. So the
18 containment itself acts as a separate backup
19 containment vessel.

20 So talk about severe accident threats in
21 the failure modes that we analyzed. Direct
22 containment heating event - if we were to have the
23 core melt through the bottom of the vessel while the
24 vessel was still at high pressure, you could see
25 direct containment heating, which might involve an

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 energetic failure of the upper dry well or a liner
2 failure of the lower dry well and connections between
3 those. When we went through the evaluation, the
4 energetic failure of the upper dry well, the pressure
5 suppression features of the containment preclude this
6 energetic failure. We don't generate a high enough
7 pressure peak to challenge the containment in a DCH
8 event. And what we have also seen is that the liner
9 failure, due to the high temperatures, we also don't
10 see a liner failure due to temperature or penetration
11 failures due to temperature.

12 The other possibility is this ex-vessel
13 steam explosion we talked about. We have a deep sub-
14 cooled pool of water below the vessel. You drop core
15 material there. The conditions are right, it won't
16 always happen, but the conditions are right for having
17 some sort of a steam explosion, so we looked at the
18 strength of the pedestal, and what we see is that if
19 the pool of water is saturated, or if it's very
20 shallow, like below 500 or 770 centimeters, it's not
21 going to fail the pedestal.

22 The other problem that we looked into was
23 in the BiMAC, all those pipes, if we have some sort of
24 an impulse load down into that, that we might crush
25 some of those pipes. And once again, as long as we

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 don't have a deep sub-cooled pool of water, we don't
2 have to worry about that.

3 DR. WALLIS: I'm sure someone's going to
4 ask you about E being as a threat to public safety.

5 DR. POWERS: Let me ask you about that.
6 I mean, I'm quite frankly stunned that you could even
7 threaten the pedestal. Were you working at the Hicks
8 Menze limit or something on these?

9 MR. WACHOWIAK: I'm sorry?

10 DR. POWERS: The Hicks - you were taking
11 the thermomatic limit on these steam explosions?

12 MR. WACHOWIAK: Yes. We were involving --

13
14 DR. POWERS: Hicks Menze I could
15 understand.

16 DR. KRESS: It's really more like 3
17 percent of that.

18 DR. POWERS: Well, that's 30 percent of
19 that, but 3 percent is the kind of numbers I would --

20 DR. KRESS: Hicks Menze is almost 50
21 percent.

22 DR. POWERS: Well, it's about 48, 49.

23 DR. KRESS: Okay.

24 MR. WACHOWIAK: And to talk about these
25 probability distributions with -- when we got into

1 looking at that, really with the deep sub-cooled pool
2 of water, the tail-end of the impulse curve just met
3 with the front end of the containment failure curve,
4 and because they overlapped we just said okay, deep
5 sub-cooled pool, we'll call it a containment failure.

6 DR. POWERS: Yes. I mean, I can
7 understand how you do that. I mean, how you would
8 come up to that conclusion. That's fine.

9 MR. WACHOWIAK: With the rest of the
10 things, we didn't see an answer.

11 DR. POWERS: The pipe crushing is the more
12 real issue. I mean, we've actually broken things
13 underneath steam explosions because there is a pretty
14 good sequel.

15 MR. WACHOWIAK: Right.

16 DR. POWERS: In real tests we would bust
17 things.

18 MR. WACHOWIAK: Finally, on the base mat
19 melt penetration, in the past like with the ABWR, the
20 certification just used the spreading criteria. If
21 it's spread out enough, and you put water on it, that
22 was okay. What recently in the last 10 years, that's
23 been called into question - does it really spread
24 enough, does it really have enough coolability from
25 the top? So in order to go ABWR method plus, we added

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the BiMAC so we can get cooling around all sides, so
2 that we think we have a double protection there now,
3 just not only the spreading, but also from cooling
4 from below.

5 DR. WALLIS: Is there any quantitative
6 assessment of these risks, quantitative assessment of
7 things like base mat melt penetration?

8 MR. WACHOWIAK: The ROAAM process gives us
9 this number that we used in the analysis, so we said
10 it has this probability of failing. The question that
11 came back is, how good is the floor if you don't have
12 the BiMAC there, and we're working on answering that
13 question.

14 SPEAKER: We didn't answer it in our
15 initial submission.

16 DR. POWERS: One of the things that you
17 really want to think about is cooling core degree is
18 a tough thing to do. What you're really worried about
19 is keeping the efficient product release down. Water
20 on top is a wonderful thing.

21 MR. WACHOWIAK: Right.

22 DR. POWERS: Water underneath is useless
23 for efficient product retention.

24 DR. KRESS: In fact, it enhances it.

25 MR. WACHOWIAK: Remember, the way it works

1 is the water comes down through, force conductive
2 cooling on the bottom, keeps going, and then pours on
3 the top, so when this device works, it actually gives
4 you both of those.

5 DR. POWERS: I'll believe that right after
6 I see it demonstrated.

7 DR. WALLIS: You want to see it
8 demonstrated?

9 MR. SIEBER: I don't want to see it
10 demonstrated.

11 MR. WACHOWIAK: It's about a 40 percent
12 void fraction is what we're expecting on the longer
13 tubes. Basically, just want to get to the conclusion
14 here. When we went through our ROAAM process, we
15 determined that with all those different threats, the
16 containment failure was really going to be in the
17 physically unreasonable range. We think we've
18 addressed all the different energetic phenomena, and
19 the things that can really challenge the containment.
20 The rest of that, I --

21 DR. SHACK: What's a complement?

22 MR. WACHOWIAK: I'm sorry. What?

23 DR. SHACK: I don't know what a complement
24 is.

25 MR. WACHOWIAK: A very nice severe

1 accident. We've addressed -- so why is the ESBWR risk
2 numbers coming down low? We talked about this,
3 several different things, but the main reason is due
4 to redundancy and diversity. We didn't really touch
5 on the instrument and control systems, or the control
6 and instrumentation systems, but we have five of them
7 installed in the plant that do various things.
8 There's a safety-related, there's a non-safety backup,
9 there's the feedwater control systems, there's the on-
10 safety systems, and then there's the ATWS prevention
11 systems.

12 In order to get the core damage just based
13 on INC system failures, you actually have to fail
14 three of those systems, and they're independent.
15 They're on different architectures. They don't have
16 ways that you'd have common mode failures.

17 If we look at the top cutsets in the PRA,
18 we see a lot of common cause batteries, common cause
19 Squib valves. You don't really see any individual
20 components anywhere in the top cutsets, so you have to
21 get the common mode failures, possibly these design
22 things or whatever before you get to a core damage
23 event.

24 One of the other interesting things is if
25 we have the SBO plus, loss of all AC and all DC power,

1 we still survive that because the isolation condenser
2 goes into service on its own in that scenario, and it
3 doesn't result in core damage. The containment
4 failure itself, we've seen in past designs where
5 containment failure would lead to an environment that
6 would take out the systems that are needed for
7 continued core cooling. In the ESBWR that doesn't
8 happen, so if we do have a containment failure, it
9 really is based on how long it takes to boil off the
10 water that's already in containment, and that's
11 greater than 72 hours. Containment can be flooded to
12 above the core using passive systems is another thing.

13 DR. KRESS: About that, what is the
14 diameter of this vessel compared to say a PWR,
15 compared to ABWR?

16 MR. WACHOWIAK: The diameter of the
17 vessel, it's the same diameter.

18 DR. KRESS: As the ABWR?

19 MR. WACHOWIAK: As the ABWR.

20 DR. KRESS: How about the AP-1000?

21 MR. WACHOWIAK: I don't know the answer to
22 that.

23 DR. KRESS: Well, the reason I'm asking is
24 that the effectiveness of flooding the vessel external
25 to the thing depends on the diameter of that vessel.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 It also depends on where there's a forest of things
2 down there, and how well the steam can get away, so I
3 was wondering how you know how effective that would
4 be, and is that to keep the core inside the vessel?
5 Is that what it's for?

6 MR. WACHOWIAK: No, that's not what we're
7 counting on this for.

8 DR. KRESS: I see.

9 MR. WACHOWIAK: What we're counting on
10 this for is if we do have pipe breaks somewhere in the
11 containment that we could get a challenge to the water
12 level in the vessel, we can flood the containment up
13 and provide core cooling.

14 DR. KRESS: Okay. I was just --

15 MR. WACHOWIAK: We're not taking any
16 credit for in-vessel retention.

17 DR. KRESS: Okay. I was misinterpreting.

18 DR. WALLIS: Now these common cause
19 failures are most likely due to human action, core
20 maintenance, core connection, somebody connected up
21 the batteries in some incorrect, or didn't maintain
22 them properly so that acid leaked out and corroded
23 something, or something. That's what you look for in
24 common cause, some human action which was common to
25 all the batteries.

1 MR. WACHOWIAK: Well, I don't know if it's
2 only due to human action, but it's something that's
3 common.

4 DR. WALLIS: That seems to me, you know,
5 if you're talking about ten to the minus ninth or
6 something, then that seems to be just as likely as
7 this --

8 MR. WACHOWIAK: But we have to remember on
9 the --

10 DR. POWERS: We have established Greek
11 letter method. The Greek letter method is the way you
12 --

13 DR. DENNING: There's a magical method,
14 Graham.

15 DR. WALLIS: Well, that's just a symbol
16 you use in the math for common cause failure.

17 DR. POWERS: No, it's not.

18 DR. WALLIS: You only put numbers on it.

19 DR. POWERS: It has a number.

20 MR. WACHOWIAK: It has a number and it's
21 supported by data.

22 DR. WALLIS: Well, let's not go that far.

23 DR. POWERS: It has an accepted number.

24 MR. WACHOWIAK: Okay.

25 DR. WALLIS: This is why, for instance,

1 you get recalls of automobiles, is a common cause
2 failure of something which is recognized after
3 experience.

4 DR. POWERS: This is why NRC is the world
5 leader in common cause failure probability estimates.

6 MR. WACHOWIAK: But we have to remember,
7 though, typically you're not going to get a core
8 damage event from a single common cause failure. It's
9 going to have to be multiple diverse common cause
10 failure. They involve those kinds of common cause
11 failures, but it's not if you have this one, it's core
12 damage. That's not the case. You have to have that
13 plus other common cause failures.

14 DR. DENNING: And I think the point isn't
15 that they can accurately estimate the common cause
16 failure. The point is that they've designed the
17 system such that you've done away with the importance
18 of single failures, so you're down into the noise of
19 common cause failures.

20 DR. POWERS: Well, you can argue that
21 that's true even for existing plants. Single failure
22 you just don't kill plants, it's always multiple
23 failures, and nearly always common cause failures.

24 DR. DENNING: In a well-designed plant,
25 that's true, but you do find some single failures in

1 those outliers that get you in trouble. But I agree
2 with you. I mean, typically that's why our plants are
3 safe.

4 MR. WACHOWIAK: Yes. Some of the other
5 things, our containment ultimate strength is fairly
6 high, 1.2 megapascals for the high confidence failure
7 pressure. In most scenarios that we look at that
8 involve a severe accident, we have .9 and less in the
9 containment. Conditions for ex-vessel steam
10 explosion, we talked about that. We do what we can to
11 avoid those so that we don't have that phenomena. The
12 containment we've shown can survive the DCH events.
13 Once again, our various diverse depressurization
14 systems keep us away from those scenarios that that
15 could happen, but even if it did, we can still deal
16 with it. And then we're not just relying on the melt
17 spread and water on top for basemat melt attack.
18 We've added an engineering feature to augment that.

19 So in conclusion, we believe that our
20 report provides a comprehensive assessment of the
21 capabilities. We've incorporated the risk insights
22 during the design phase, and that's what helps drive
23 our risk numbers down to this low range. And we meet
24 all the goals with significant margin, and we think
25 it's a very safe plant, with a good safety design.

1 MR. HINDS: That's the conclusion of our
2 prepared presentation today. We thank you for your
3 time. If you have further questions for us --

4 DR. WALLIS: Thank you, that's very nice.
5 We've heard this sort of thing before. What we now
6 need to do is do some real work with subcommittees to
7 look at the details of this, it seems to me.

8 MR. HINDS: Thermal hydraulic stability is
9 the first one up for subcommittees?

10 MS. CUBBAGE: Yes, that'll either be in
11 January or February for thermal hydraulic stability,
12 and then we're also looking at a PRA subcommittee
13 meeting also in the February --

14 DR. WALLIS: Are there any materials
15 issues that need to be looked at?

16 DR. POWERS: One question I forgot to ask
17 you is was the dry well, wet well through containment
18 leakage in this plant?

19 MR. WACHOWIAK: It's similar to other
20 BWRs. It's half a percent per day weight volume, or
21 weight leakage. It's all the same. Okay?

22 DR. POWERS: Okay. Thank you.

23 DR. WALLIS: I'm very glad we finished on
24 the quarter hour, the half hour. We're going to take
25 a break. We don't need the transcript after the

1 break. Thank you very much. We're going to take a
2 break until quarter to four.

3 (Whereupon, the proceedings went off the
4 record at 3:27:58 p.m.)

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

CERTIFICATE

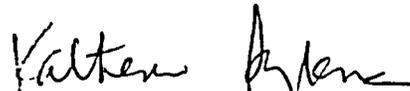
This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on
Reactor Safeguards
527th Meeting

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.



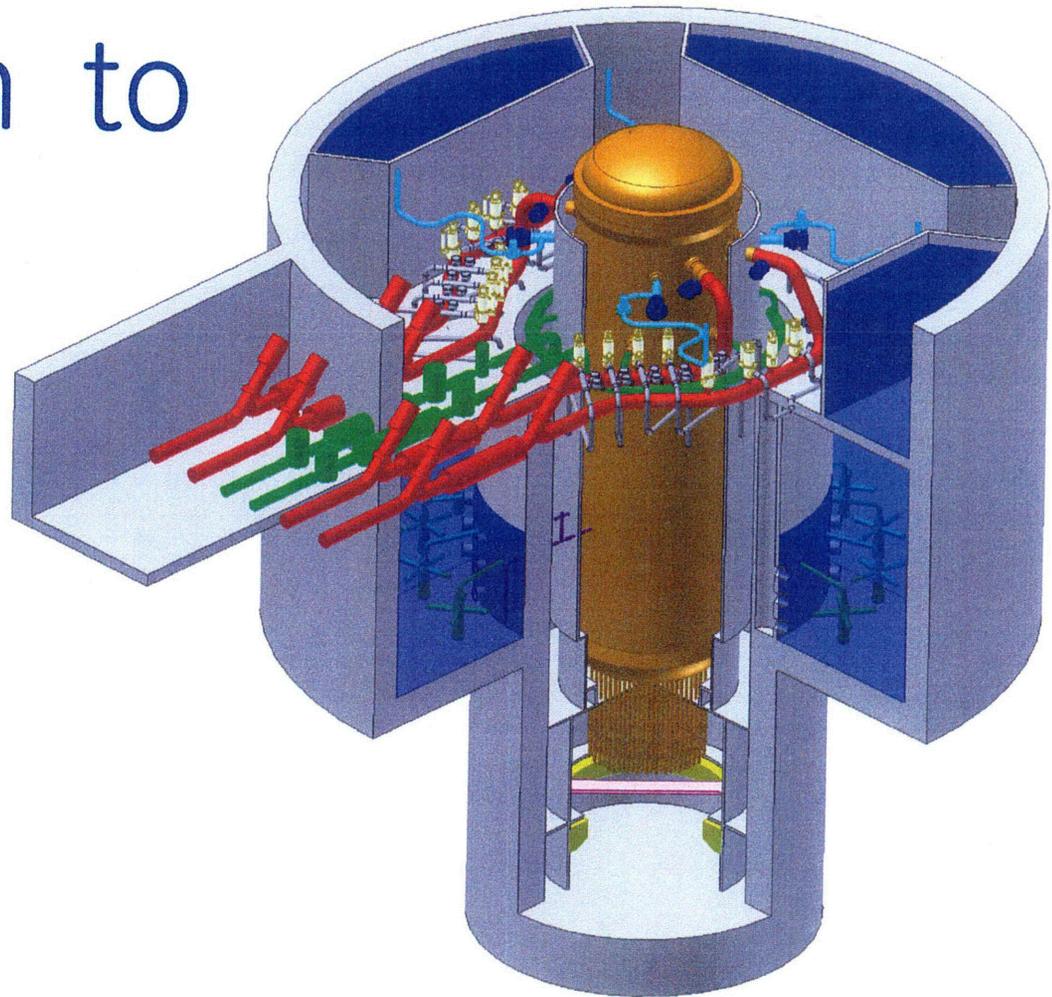
Katherine Sykora
Official Reporter
Neal R. Gross & Co., Inc.

NEAL R. GROSS
COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

ESBWR Overview Presentation to the ACRS



David Hinds
J. Alan Beard
Rick Wachowiak
November 3, 2005

Presentation Content

- Design Certification Application Status
- BWR Design Evolution
- ESBWR Primary Characteristics
 - > Design Improvements
- ESBWR Passive Systems
- Probabilistic Risk Assessment (PRA) Summary

ESBWR

- Builds on the ABWR certified design
 - > Current project in progress at Lungmen
 - > Experience base developed
 - Suppliers
 - Global and Qualified
 - Digital C&I Design
- GE is committed to producing a quality product
- ESBWR design will Continue to build on the ABWR experience and technology

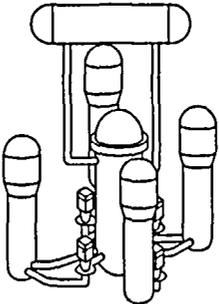
ESBWR DCD Submittal

- Comprehensive DCD Submitted
 - > Reg Guide 1.70 format
 - > Built on experience and lessons learned from SBWR & ABWR applications
 - > Incorporated many of the regulatory positions established during the review of the AP-1000
 - Main Control Room Habitability
 - Regulatory Treatment of Non Safety Systems (RTNSS)
 - Diverse Digital C&I

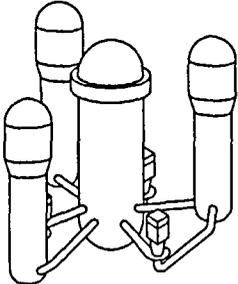
Status of DCD Submittal

- DCD submitted to the NRC on 8/24/05
- NRC initiated a prompt and thorough review of application
- Acceptance review letter received by GE
 - > Identified a number of areas requiring further detailed information
 - > Two days of meetings with Staff to review application
- GE provided additional information and responses by letter on 10/24/05
 - > Provided revised DCD sections and other technical material

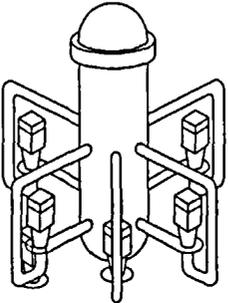
BWR Evolution



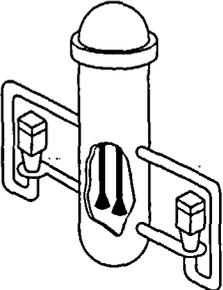
Dresden 1



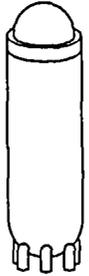
KRB



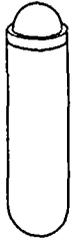
Oyster Creek



Dresden 2



ABWR

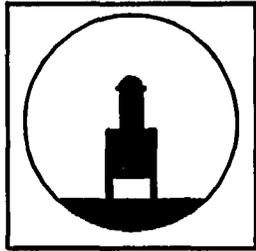


SBWR

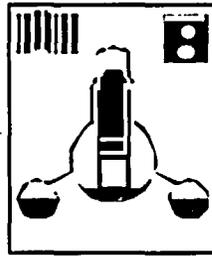


ESBWR

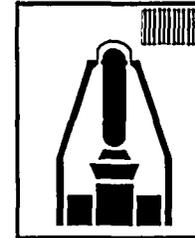
Containment Evolution



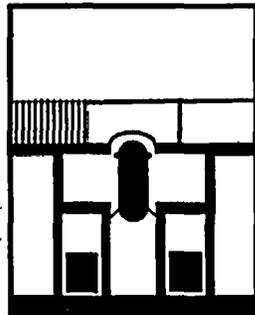
DRY



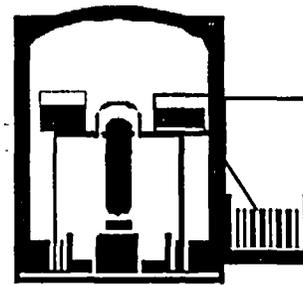
MARK I



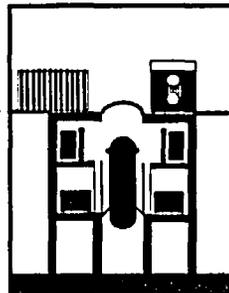
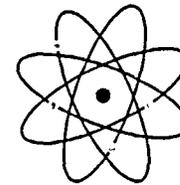
MARK II



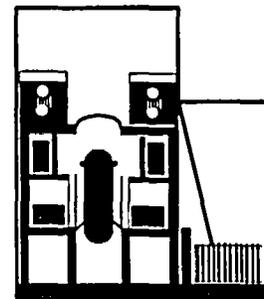
ABWR



MARK III



SBWR



ESBWR

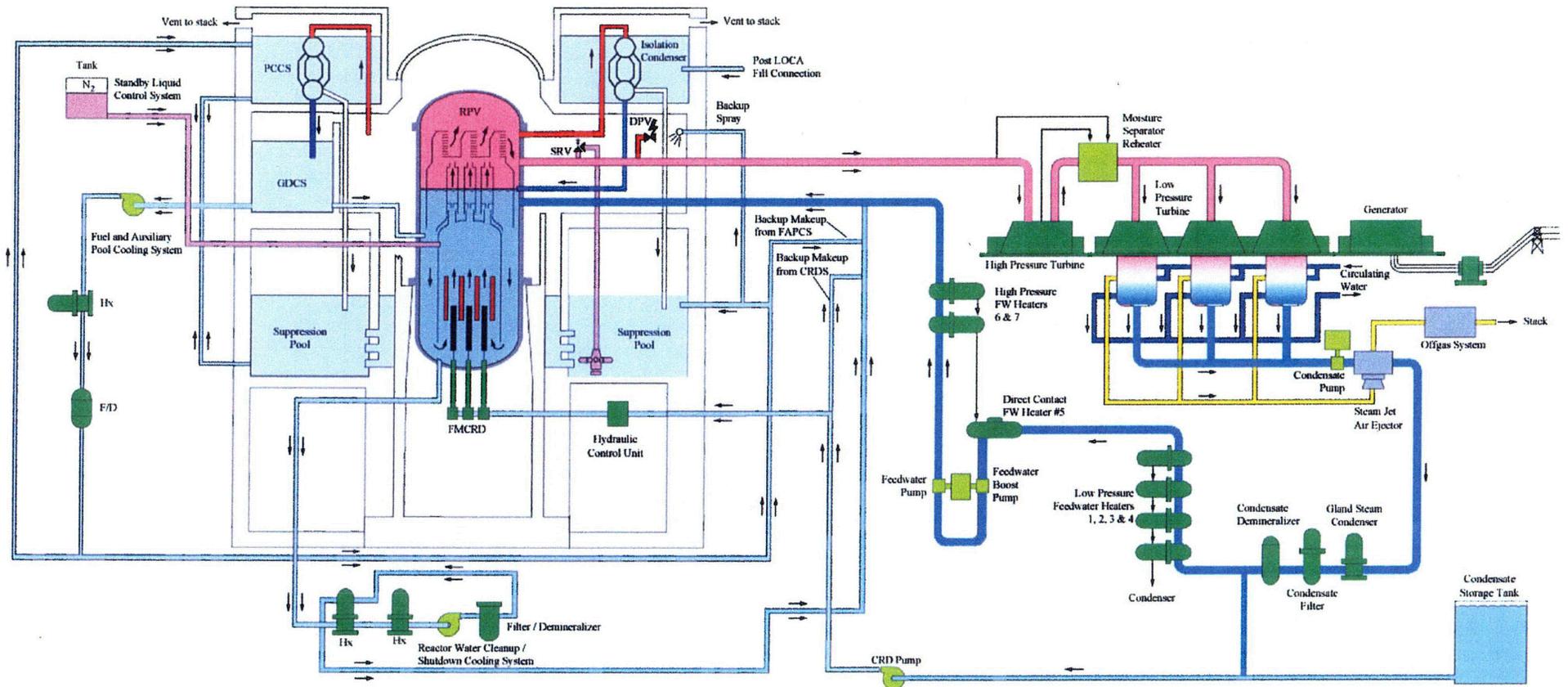
Site Parameters

- EPRI Utility Requirements Document Plus
 - > Tornado
 - 330 mph
 - > Extreme Winds
 - 140 mph for safety-related
 - > Temperatures
 - Bound the 3 ESP sites
 - Increased wet-bulb temperatures
 - > Seismic
 - Reg Guide 1.60 plus a CEUS hard rock site

ESBWR Basic Parameters

- 4,500 Megawatt Core Thermal Power
- ~1,575 Megawatt Electric Gross
- Natural Circulation
 - > No recirculation pumps
- Passive Safety Systems
 - > 72 hours passive capability

ESBWR Overall Schematic



What's different about ESBWR

ABWR	ESBWR
Recirculation System + support systems	Eliminated
HPCF System (2 each)	Eliminated need for ECCS pumps Utilize passive and stored energy
LPFL (3 each)	
Residual Heat Removal (3 each)	
Safety Grade Diesel Generators (3 each)	Eliminated - only 2 non-safety grade diesels
RCIC	Replaced with IC heat exchangers
SLC -2 pumps	Replaced pumps with accumulators
Reactor Building Service Water (Safety Grade) And Plant Service Water (Safety Grade)	Made non-safety grade

Optimized Parameters for ESBWR

<u>Parameter</u>	<u>BWR/4-Mk I</u> (Browns Ferry 3)	<u>BWR/6-Mk III</u> (Grand Gulf)	<u>ABWR</u>	<u>ESBWR</u>
Power (MWt/MWe)	3293/1098	3900/1360	3926/1350	4500/1575
Vessel height/dia. (m)	21.9/6.4	21.8/6.4	21.1/7.1	27.7/7.1
Fuel Bundles (number)	764	800	872	1132
Active Fuel Height (m)	3.7	3.7	3.7	3.0
Power density (kw/l)	50	54.2	51	54
Recirculation pumps	2(large)	2(large)	10	zero
Number of CRDs/type	185/LP	193/LP	205/FM	269/FM
Safety system pumps	9	9	18	zero
Safety diesel generator	2	3	3	zero
Core damage freq./yr	1E-5	1E-6	1E-7	3E-8
Safety Bldg Vol (m ³ /MWe)	115	150	160	< 130

Vessel flange and closure head

Steam dryer assembly

DPV/IC outlet

Steam separator assembly

RWCU/SDC outlet

Forged shell rings

IC return

GDCS inlet

Vessel support

GDCS equalizing line inlet

Fuel and control rods

Fuel supports

Control rod guide tubes

In-core housing

Shroud support brackets

Steam outlet flow restrictor

Stabilizer

Feedwater nozzle

Chimney

Chimney partitions

Top guide

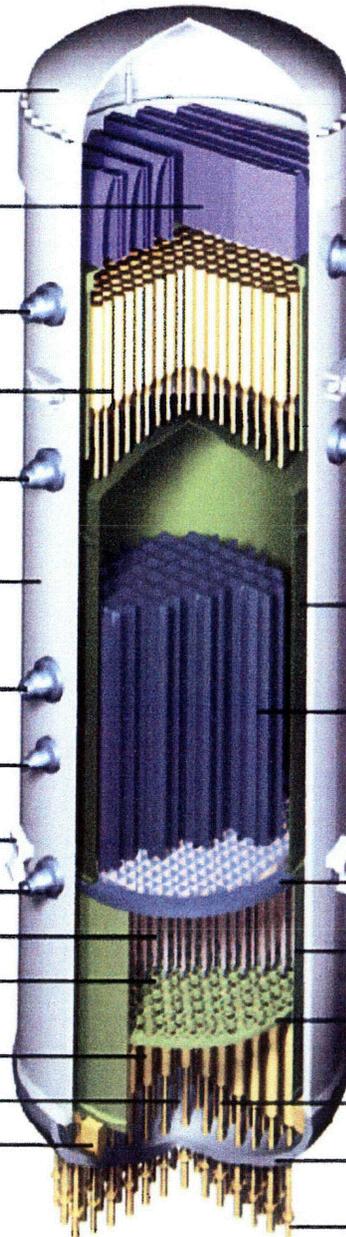
Core shroud

Core plate

Control rod drive housings

Vessel bottom head

Control rod drives



imagination at work

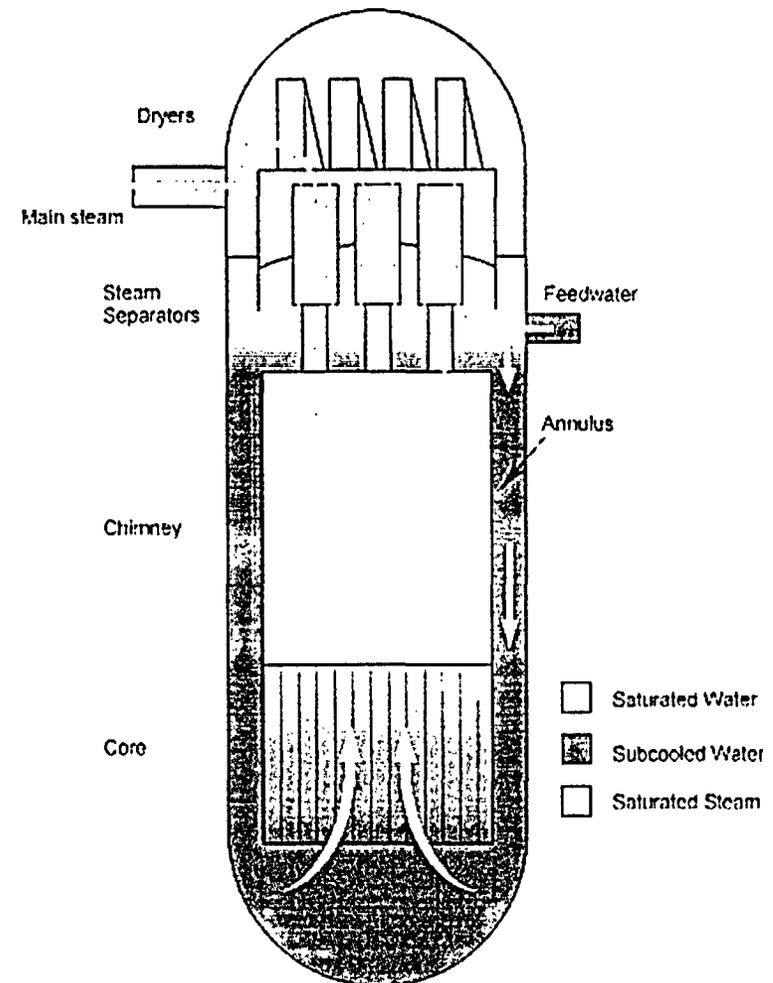
Other Design Improvements

- 100% Steam Bypass
 - > Island Mode of Operation
- Fine Motion Control Rod Drives (FMCRD)
- Shoot-out Steel Eliminated
- Integrated Head Vent Pipe
- Improved Incore Instrumentation
 - > Start-up Range Neutron Monitor (SRNM)
 - > Gamma Thermometer
 - No Traversing Incore Probe (TIP)

Natural Circulation

Simplification without performance loss ..

- **Passive safety/natural circulation**
 - Increase the volume of water in the vessel
 - Increase driving head
- **Significant reduction in components**
 - Pumps, motors, controls, HXers
- **Power Changes with Control Rod Drives**
 - Minimal impact on maintenance



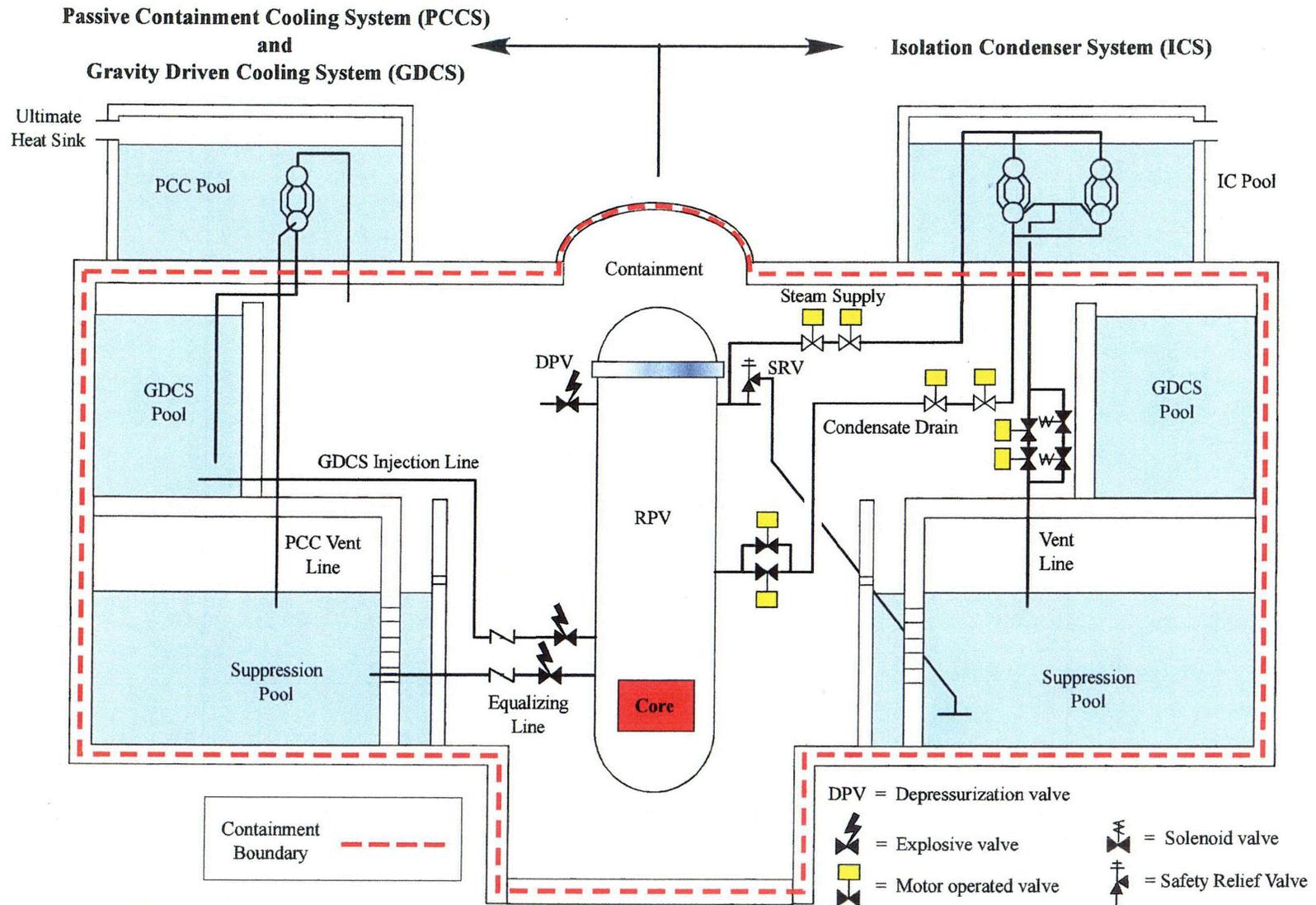
Anticipated Operational Occurrences

- Reliable controls eliminate most limiting AOOs
- Large steam volume in reactor mitigates pressure increases
 - > No pressure overshoot in any AOO
- IC prevents SRV opening in all AOOs
- CPR change lower than forced circ. BWRs
 - > Loss of FW Heating is Limiting CPR, slow quasi-static response
- Loss of Coolant Accidents (LOCA)
 - > Large margin to fuel uncover in all pipe breaks
 - Only Passive systems credited
 - Designed for 72 hrs w/o external AC power or operator action

AOO Without Scram (ATWS)

- Scram discharge volume eliminated
 - > Eliminates common mode failure
- Electric Control Blade insertion diverse from hydraulic scram
- FW runback results in decreased water level, core flow, & power reduction; automated and diverse from scram logic
- Boron Injection is direct to core bypass
 - > Eliminates lower plenum boron stratification
- Boron accumulator initial flowrate exceeds 10CFR50 requirement
 - > Shutdown achieved quickly w/o depressurizing
- After shutdown IC terminates steam flow to suppression pool and pool heatup

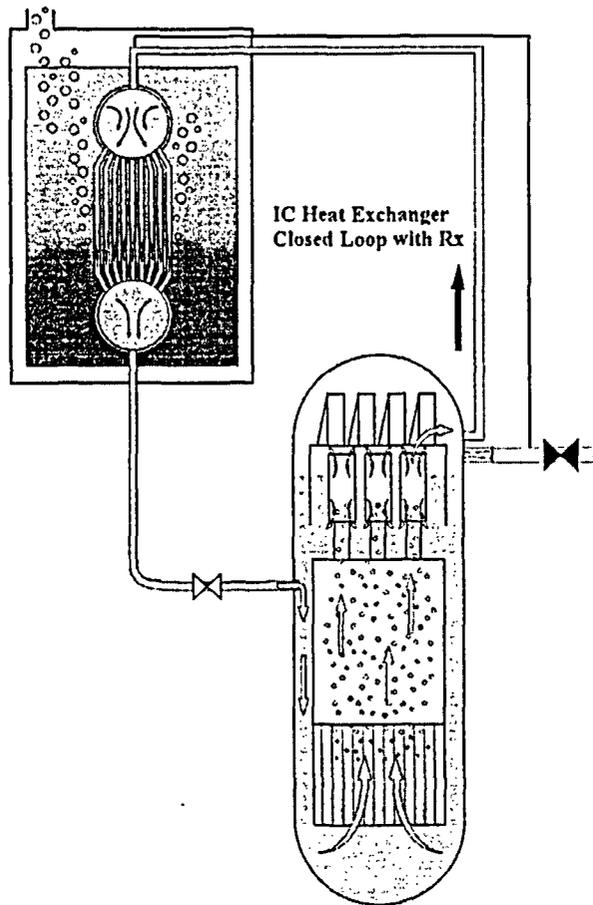
Passive Safety



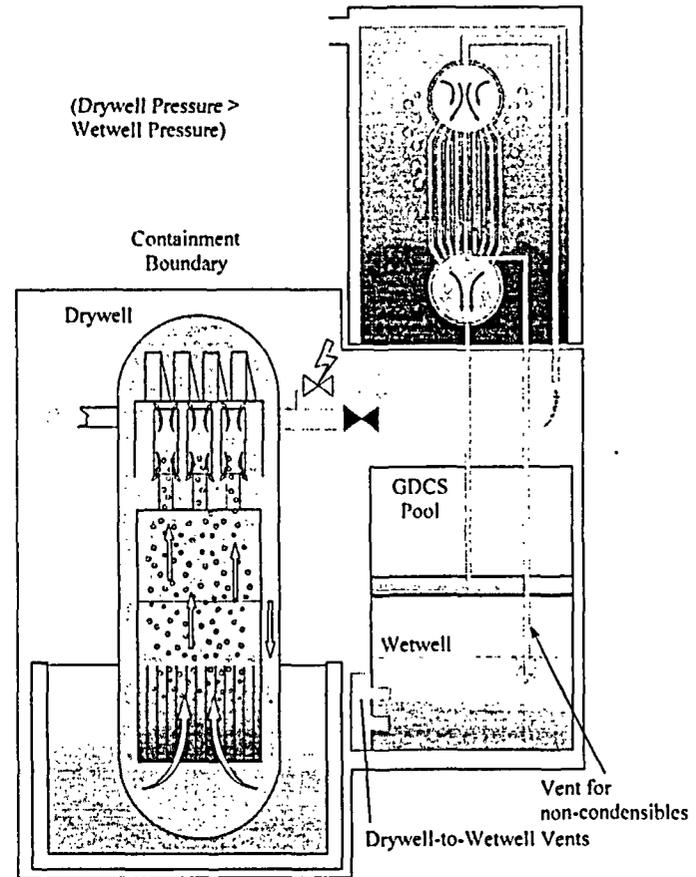
imagination at work

Passive Safety Systems ...

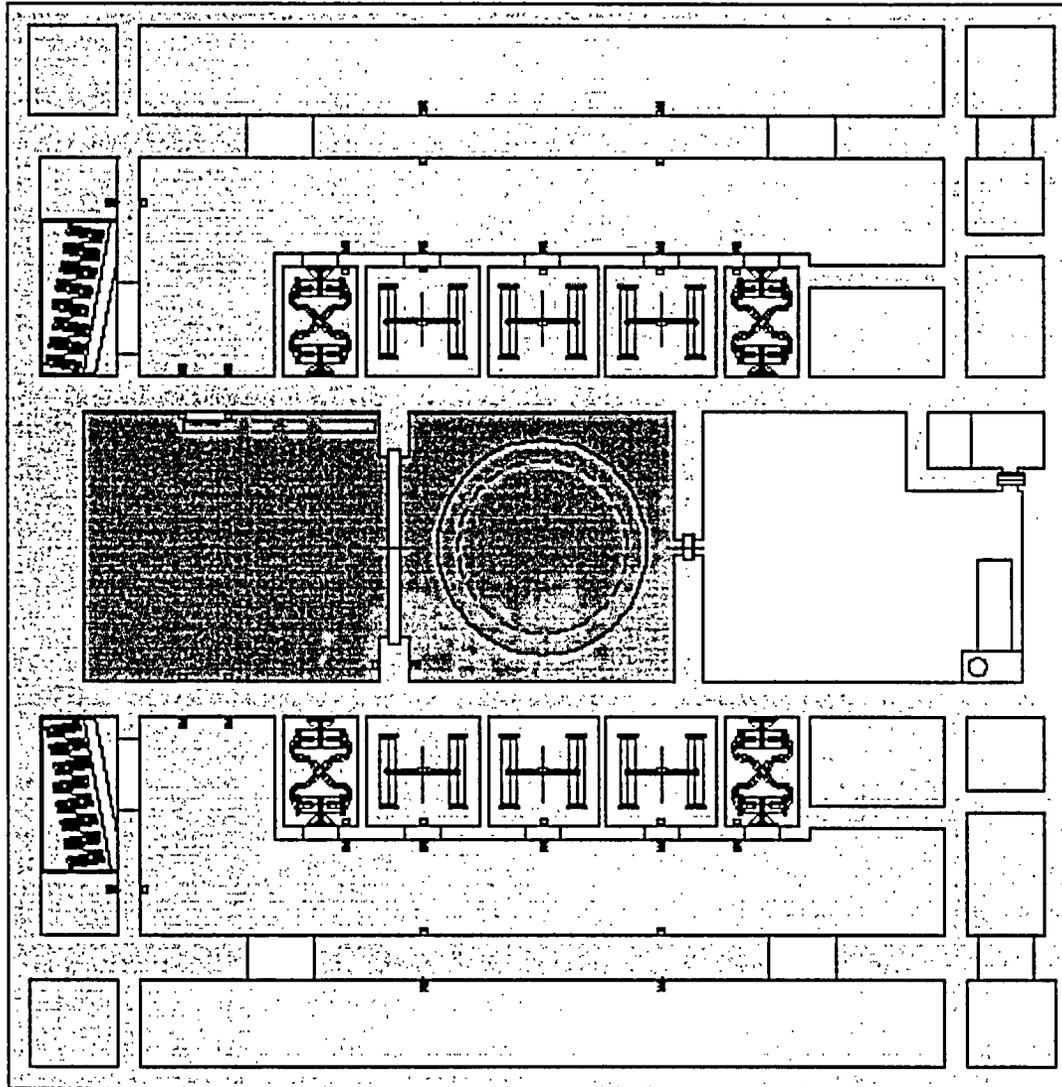
Isolation Condenser System



Passive Containment Cooling



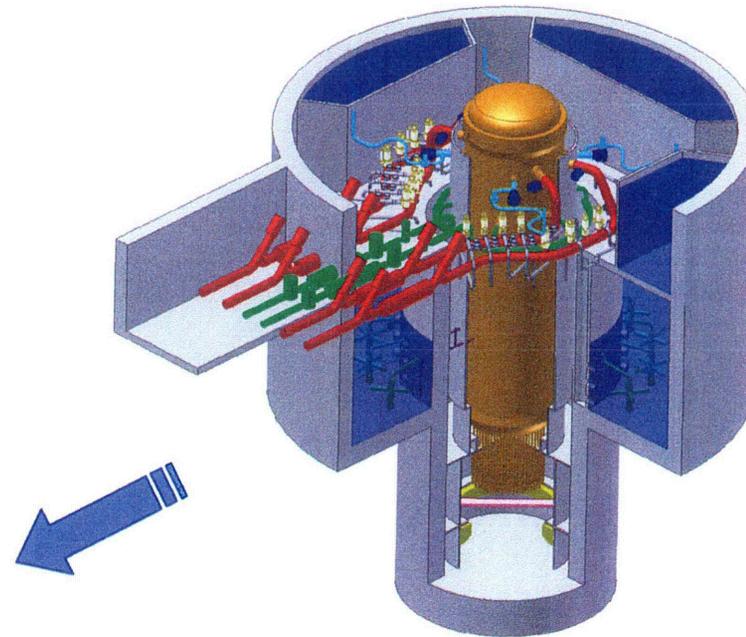
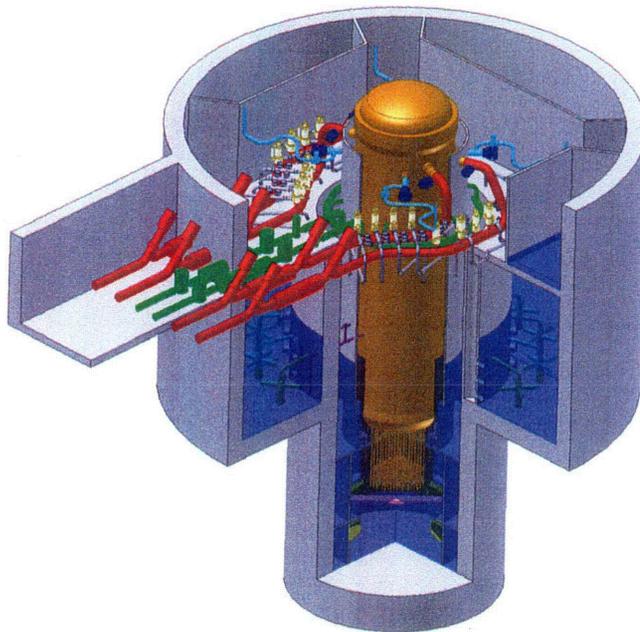
72 Hours Passive Capability



Gravity Driven Cooling System ...

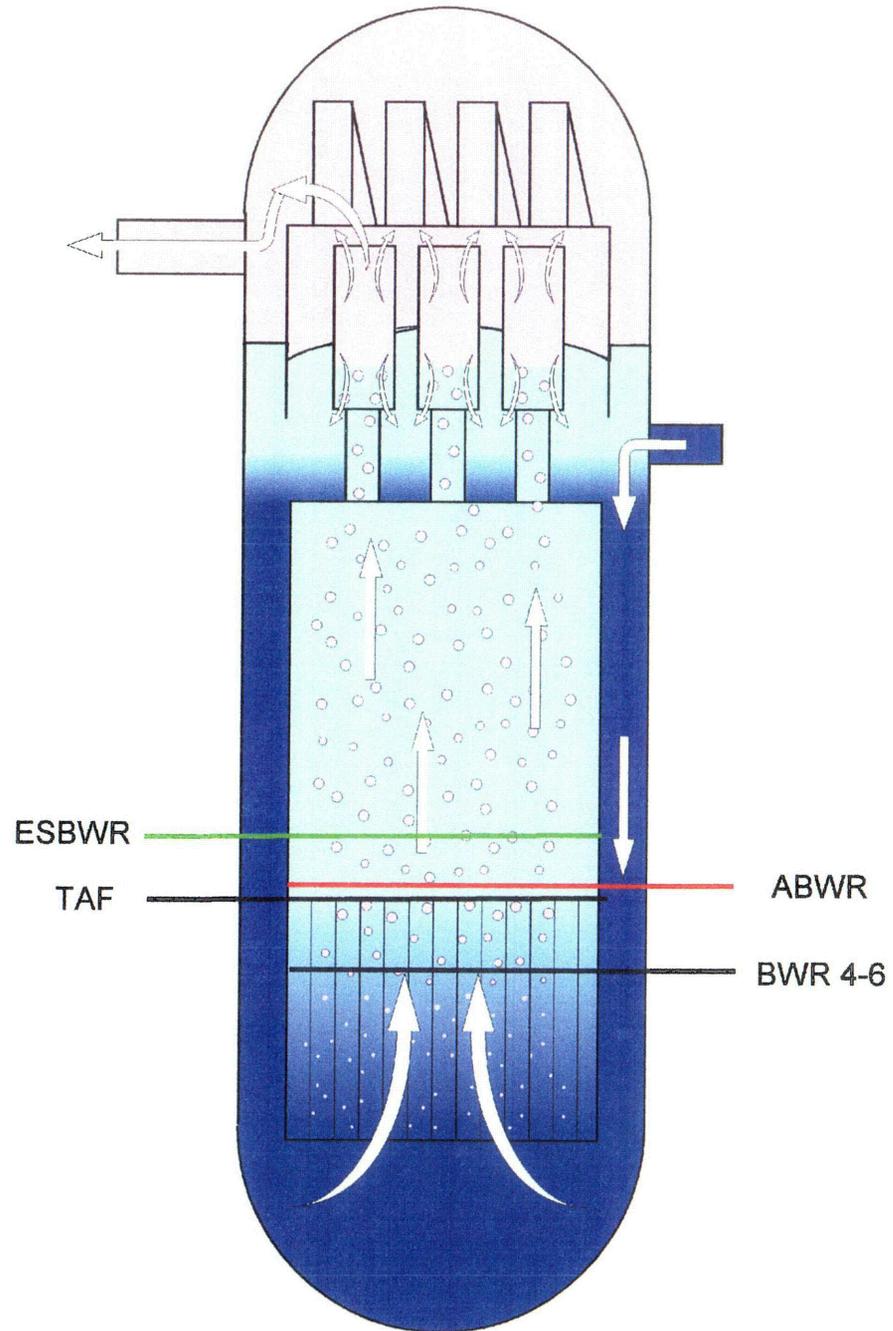
Simple design
Simple analyses

Extensive testing
Large safety margins

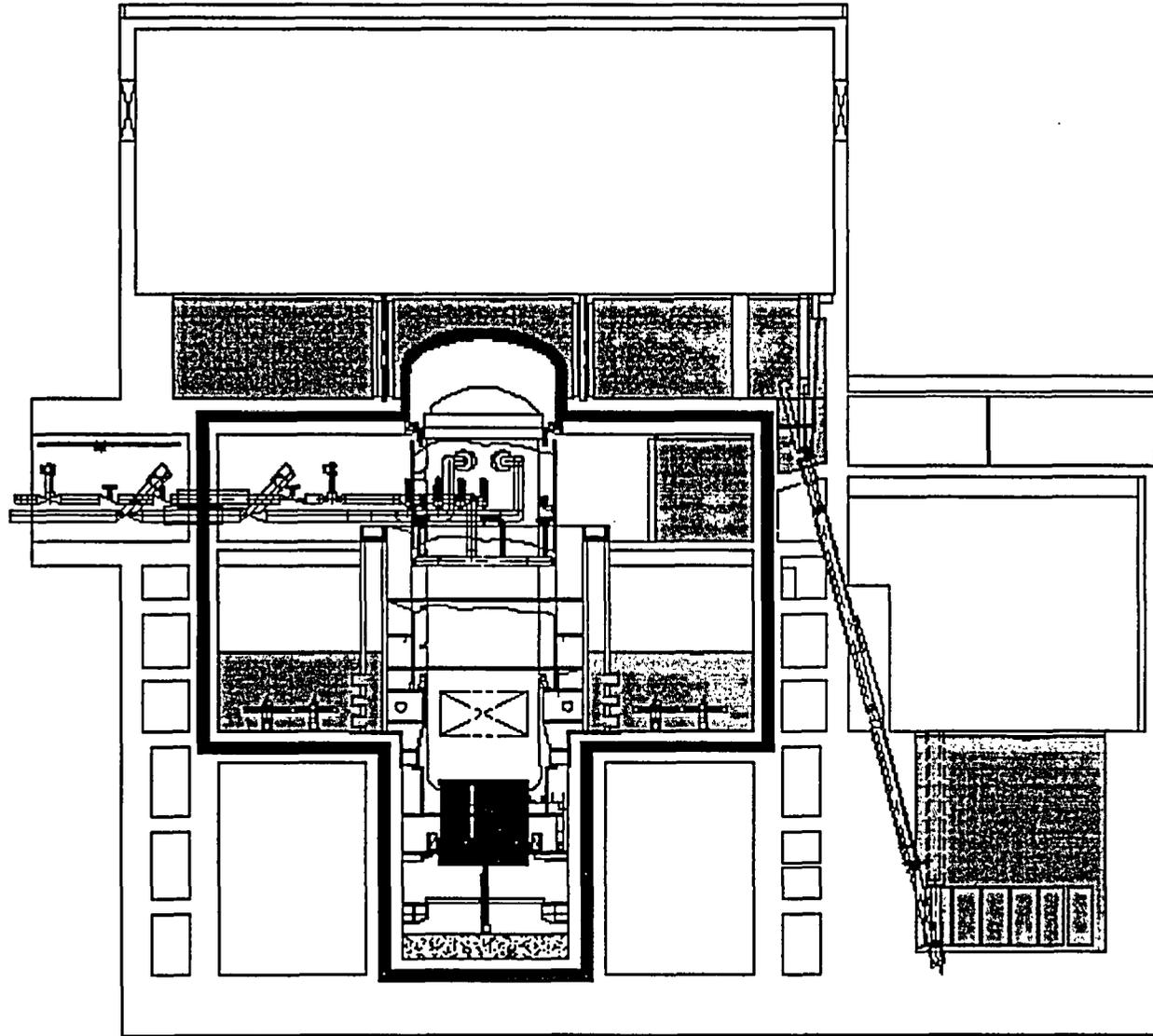


Gravity driven flow keeps core covered

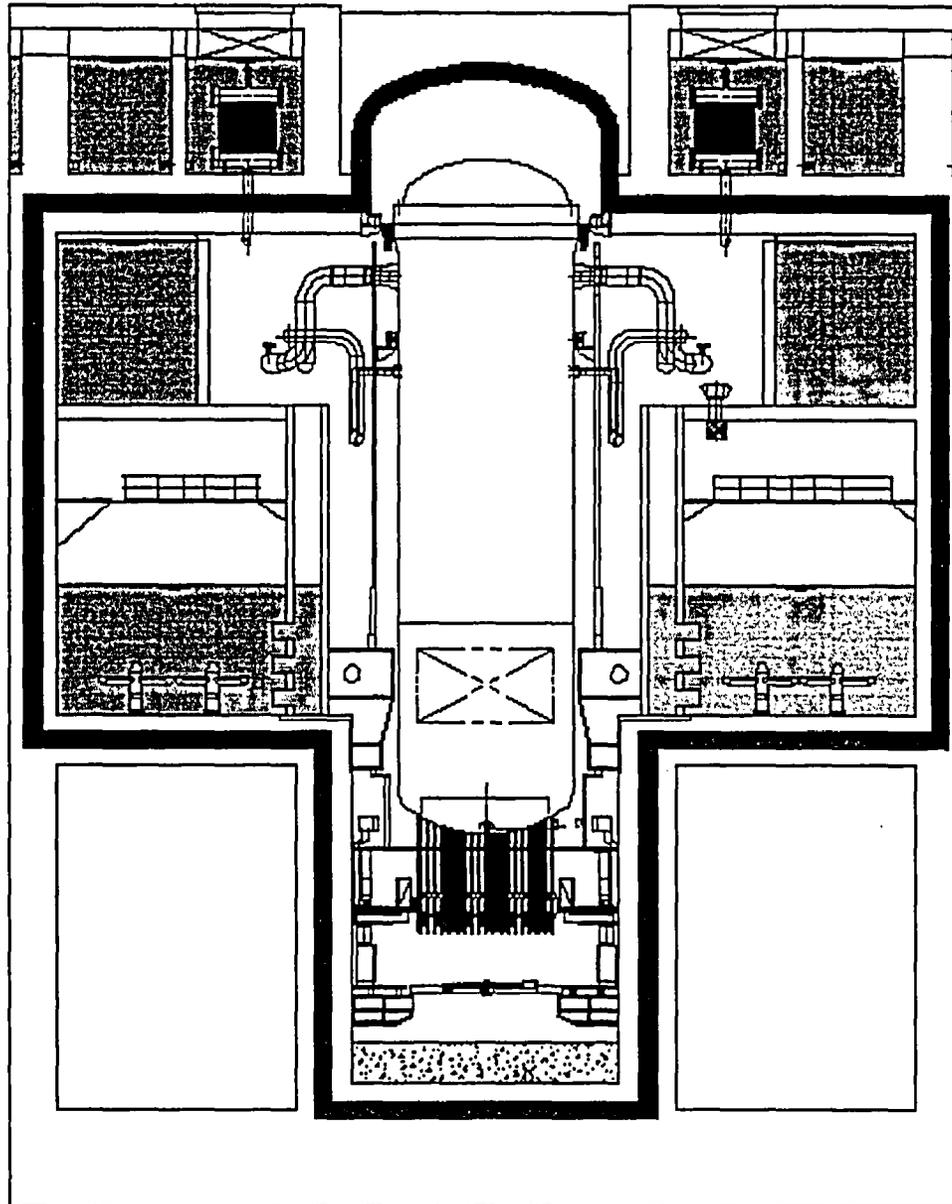
LOCA Water Level Response



Reactor and Fuel Building



Containment

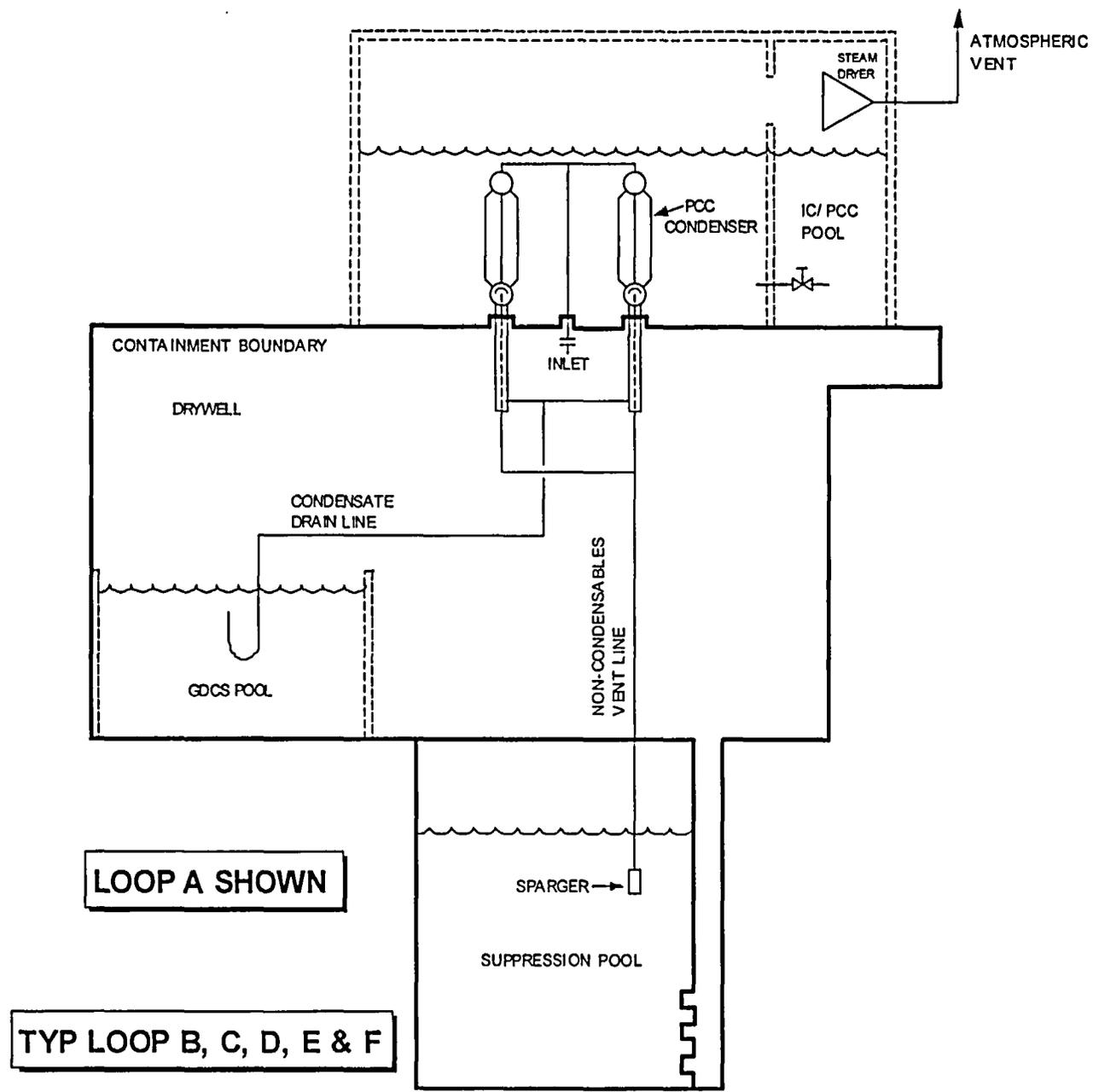


Isolation Condensers

- ICs provide passive decay heat removal
 - > Single Failure Criteria apply
 - > No lift of the Safety Relief Valves (SRVs)
 - > Operates in all Design Basis Conditions except medium and large break LOCAs
 - > ICs transport decay heat direct from NSSS to the Ultimate Heat Sink
 - > No steaming in the primary containment
 - > Rapidly reduces RPV pressure
 - > Redundant Active Components

Passive Containment Cooling

- PCCs provide passive decay heat removal from the primary containment
 - > Operates in medium and large break LOCAs
 - > Provides backup of ICs if needed
 - RPV is depressurized using DPVs
 - > Entirely Passive
 - ~40 hours with demineralized water
 - Opening 1 of 4 valves extends passive to 72 hours



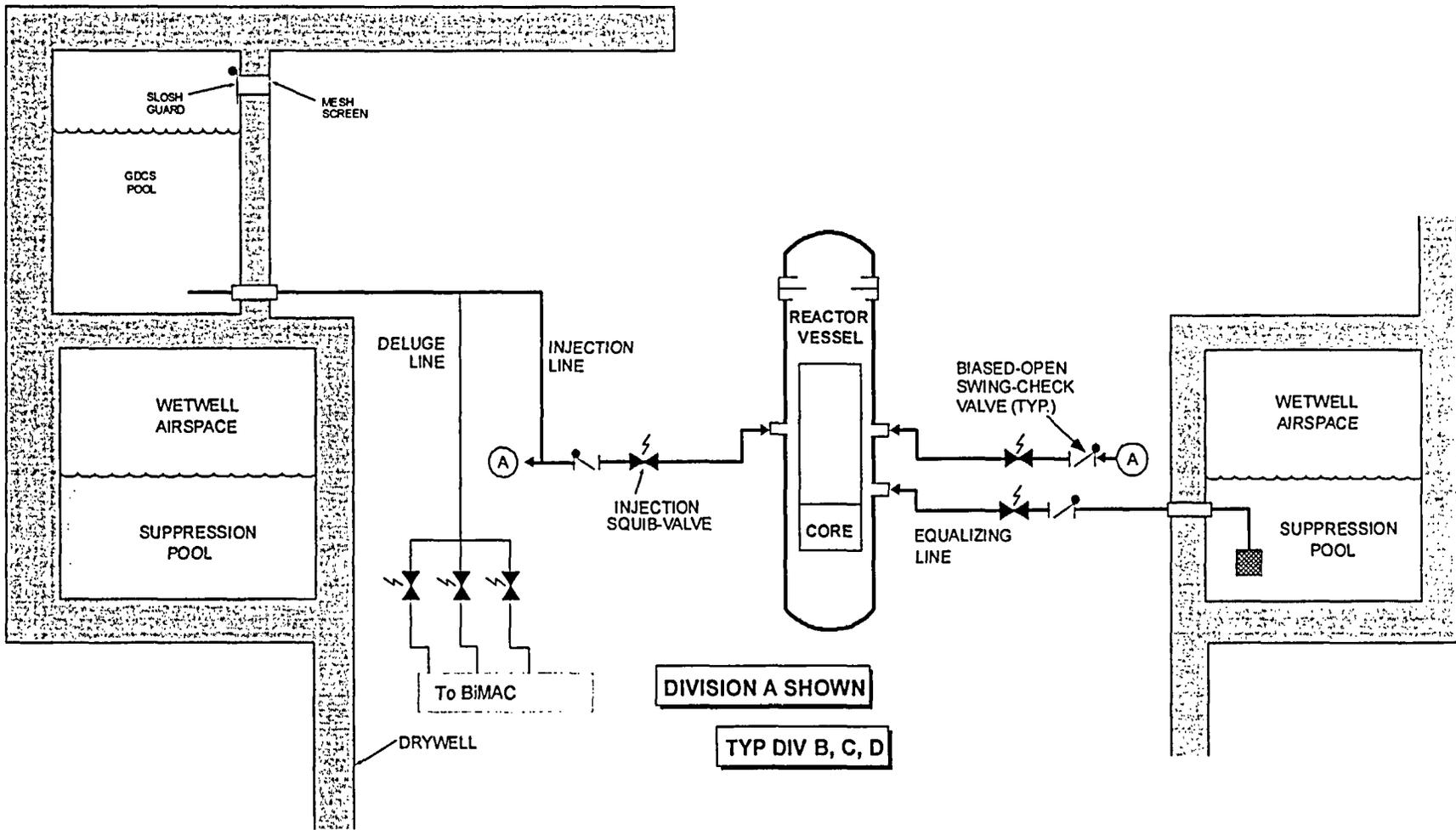
imagination at work

Emergency Core Cooling (ECC)

- Gravity Driven Cooling System (GDACS)
 - Three Pools
 - > ~1700 m³ of water
 - Four Trains
- Automatic Depressurization System (ADS)
 - > 10 of 18 Safety Relief Valves (SRV)
 - Pneumatic actuation
 - > 8 Depressurization Valves (DPV)
 - Squib actuated

Emergency Core Cooling (cont)

- Core remains covered for entire range of Design Basis Accidents
 - > No fuel heat-up
- Complies with 10 CFR 50.46
 - > Codes have been approved by NRC
- Stored water is sufficient to flood containment to above the top of fuel



Gravity-Driven Cooling System



imagination at work

PRA Scope

- Internal Events, Power Operation
 - > Level 1, 2, and 3
- Internal Events, Shutdown
 - > Level 1
 - > 99% SDCDF in mode 6, so no level 2 required
- External Events (non-Seismic)
 - > Screening shows no impact on risk
- Seismic
 - > Seismic margins analysis identified no outliers

Definitions

Core Damage

- Defined as: PCT > 2200 °F
- In practice, GE used “Core Uncovered” as a surrogate for core damage

Containment Failure

- Uncontrolled Release
- Venting Release

Comprehensive System Analysis

- Detailed Fault Tree Model
 - > 24 systems modeled
 - > Major components included
 - > Fully linked support systems
 - > Intra-system common cause
 - > Inter-system common cause for squib valves

Containment Performance

- Level 2 Linked Directly to Level 1
- Phenomena Probabilities from ROAAM
 - > High confidence, rather than mean, values used

Data Used in the Analyses

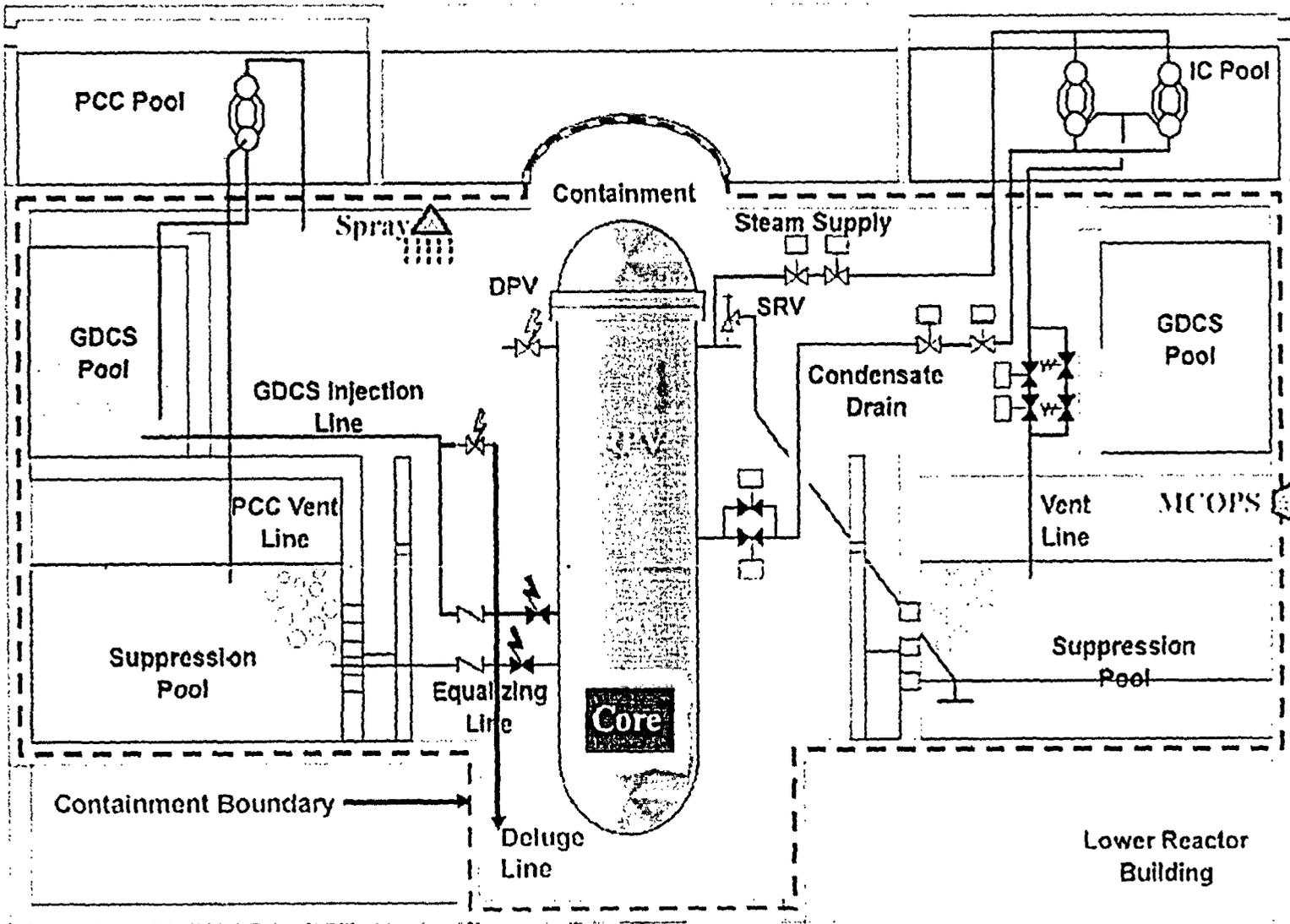
- Initiating Events Based on Operating Plants
- Generic Data For Components
 - > Adjusted for environmental conditions
 - > Adjusted for long test intervals
- Screening Values for Operator Actions

Low CDF Due to Design Rather than Data Values

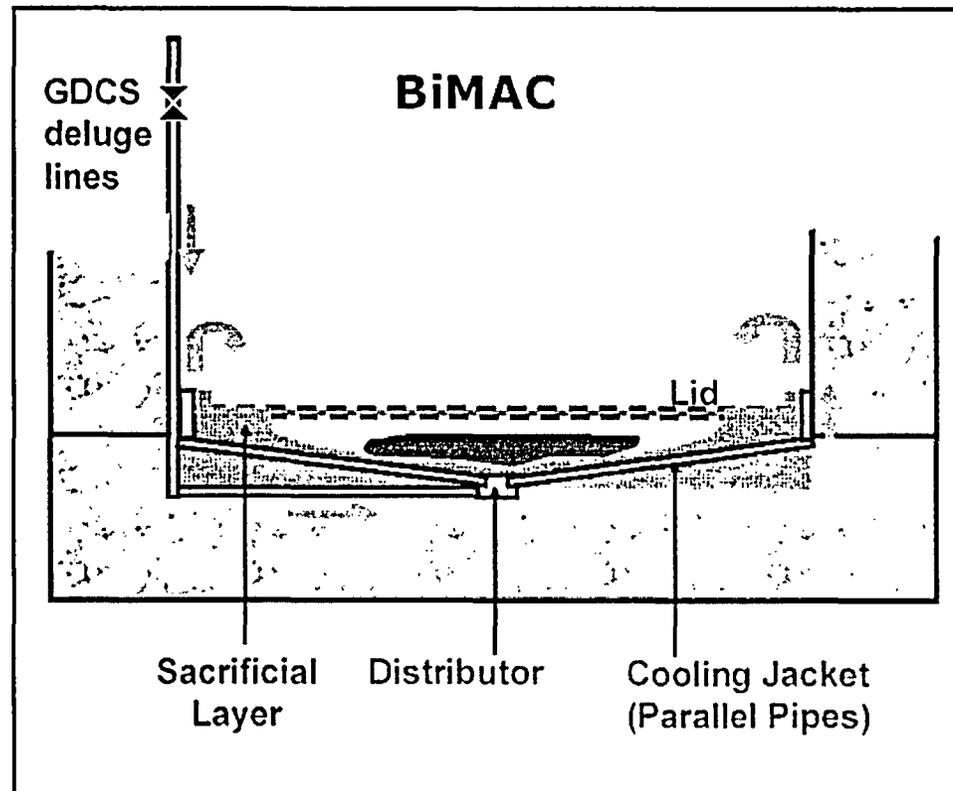
The Bottom Line

Internal Events CDF	3.2×10^{-8}
Internal Events LRF	1×10^{-9}
CCFP	0.025
Probability of Exceeding 25 Rem at 1/2 Mile	2×10^{-9}
External Events Contribution	negligible
Shutdown CDF	4×10^{-9}

ESBWR SA Containment Highlights

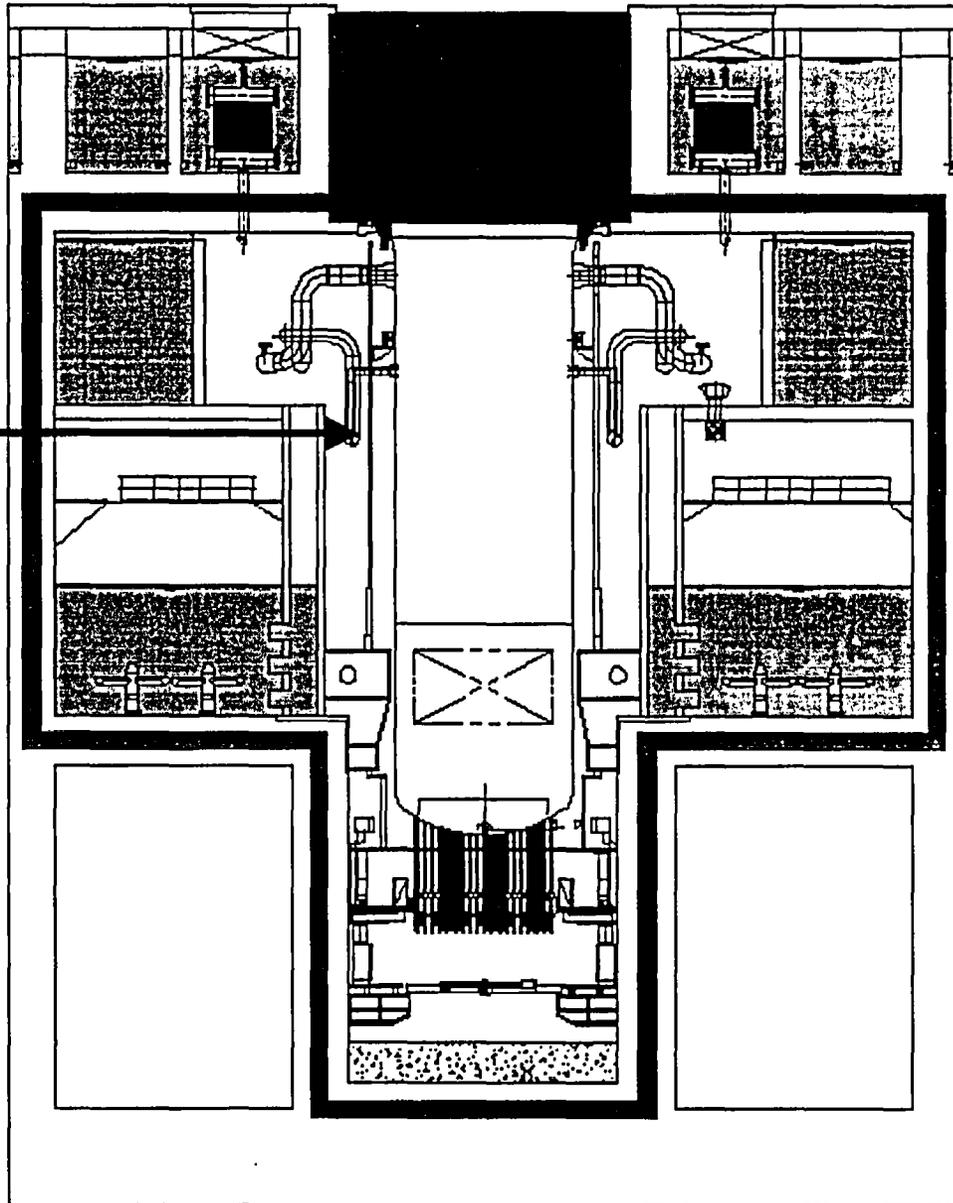


The Basemat internal Melt Arrest and Coolability (BiMAC) device



Containment Capacity
During Shutdown
LOCA

Approximate
Water Level
Using Water in
Reactor Building



SA Threats and Failure Modes

- Direct Containment Heating (DCH)
 - > Energetic Failure of UDW
 - > Liner Failure of UDW/LDW
- Ex-Vessel Explosions (EVE)
 - > Pedestal/Liner Failure
 - > BiMAC-Pipes Crushing,
- Basemat Melt Penetration (BMP)
 - > BiMAC Thermal Failure (Burnout, Dryout)

Treatment of Severe Accidents

Severe Accidents in ESBWR.....CDF $\sim 3 \times 10^{-8}$ per year

- That is, they are Remote & Speculative
- Could be treated as Residual Risk

GE Designs for Defense-In-Depth

- > Assess full compliment of severe accident threats
- > Determine and Enhance ESBWR capabilities
- > Verify by a full ROAAM treatment

Conclusion:

Containment Failure is Physically Unreasonable

Attributes of ESBWR Risk

Redundancy and Diversity!!

At Least 3 I&C Systems Need to Fail for Core Damage

Top Cutsets Involve

- > CCF of Batteries
- > CCF of Squib Valves

Loss of All Electric Power (AC & DC) Itself Does Not Result in Core Damage

Containment Failure Does Not Lead to Core Damage within 72 Hours

Containment Can Be Flooded Above Core Using Passive Systems

Attributes Affecting Risk (continued)

- High Containment Ultimate Strength
 - > High confidence pressure 1.2 MPaG
 - > Most scenarios well below 0.9 MPaG
- Conditions for Ex-Vessel Explosion Avoided
- Containment Survives DCH Events
- BiMAC Precludes Basemat Attack

Conclusions

PRA Report Provides a Comprehensive Assessment of
ESBWR Mitigation Capabilities

Incorporating Risk Insights During Design Drives
Reliability

ESBWR Satisfies Risk Goals With Significant Margin



Draft Final Generic Letter 2005-xx, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power"

Presentation to ACRS

Ronaldo Jenkins

Office of Nuclear Reactor Regulation



Agenda

- Introduction / Overview
- Public Comments on Draft Generic Letter
- Staff Changes to Draft Generic Letter
- RES Supporting Actions



Acronyms

- ACRS Advisory Committee on Reactor Safeguards
- FERC Federal Energy Regulatory Commission
- GDC General Design Criterion
- GL Generic Letter
- LOOP Loss of Offsite Power
- NERC North American Electric Reliability Council
- NPP Nuclear Power Plant

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

3



Acronyms

- NRR Office of Nuclear Reactor Regulation
- RES Office of Nuclear Regulatory Research
- RTCA Real Time Contingency Analysis
- SBO Station Blackout
- SRM Staff Requirements Memorandum
- TI Temporary Instruction
- TSO Transmission System Operator

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

4



Introduction/Overview

- CHRONOLOGY
 - ◆ AUGUST 14, 2003, BLACKOUT RAISED CONCERNS REGARDING COMPLIANCE WITH NRC REGULATIONS
 - ◆ MAY 18, 2004, SRM ASKED THE STAFF TO CONSIDER WHAT NRC SHOULD DO TO FACILITATE AND IMPROVE COMMUNICATIONS BETWEEN NPPs AND TSOs
 - ◆ NOVEMBER 4, 2004, NRR BRIEFED THE ACRS ON GRID ISSUES
 - ◆ DECEMBER 2004, THE STAFF CONCLUDED THAT A GENERIC LETTER WAS WARRANTED BASED ON RISK INFORMED AND DETERMINISTIC REVIEWS AND THE RESULTS FROM TI 2515/156, "OFFSITE POWER SYSTEM OPERATIONAL READINESS."

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

5



Introduction/Overview

- CHRONOLOGY (CONT'D)
 - ◆ APRIL 12, 2005, ISSUED DRAFT GENERIC LETTER FOR PUBLIC COMMENTS
 - ◆ APRIL 26, 2005, COMMISSION BRIEFING ON GRID STABILITY
 - ◆ MAY 19, 2005, SRM ASKED THE STAFF TO ISSUE FINAL GENERIC LETTER NO LATER THAN DECEMBER 15, 2005
- RESULTS OF TWO TEMPORARY INSTRUCTIONS COMPLETED IN 2004 AND 2005 INDICATED A GREAT DEAL OF VARIABILITY ON THE USE OF NPP/TSO PROTOCOLS

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

6



Introduction/Overview

- STRUCTURE OF GENERIC LETTER
 - ◆ QUESTIONS BASED UPON REGULATORY INFORMATION SUMMARY (RIS) 2004-05, "GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER," WHICH WAS ISSUED IN APRIL 2004
 - ◆ AREAS OF INQUIRY
 - ◆ 4 QUESTIONS – GDC 17/TECHNICAL SPECIFICATIONS
 - ◆ 2 QUESTIONS- MAINTENANCE RULE
 - ◆ 2 QUESTIONS - SBO

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

7



Draft Final Generic Letter 2005-xx, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power"

Presentation to ACRS

Paul Gill

Office of Nuclear Reactor Regulation



Public Comments to Draft GL

■ COMMENTS RECEIVED FROM:

- ◆ VARIOUS NUCLEAR POWER UTILITIES/OWNER GROUPS
- ◆ NUCLEAR ENERGY INSTITUTE
- ◆ THE OAK RIDGE NATIONAL LABORATORY
- ◆ THE STATE OF NEW JERSEY
- ◆ BONNEVILLE POWER ADMINISTRATION
- ◆ MR. K. M. STRICKLAND

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

9



Public Comments to Draft GL

■ COMMENTS PERTAINED TO:

- ◆ GDC 17, "ELECTRIC POWER SYSTEMS"
- ◆ 10 CFR 50.65 (MAINTENANCE RULE)
- ◆ 10 CFR 50.63 (SBO RULE)
- ◆ SCHEDULE
- ◆ LEGAL/BACKFIT
- ◆ MISCELLANEOUS

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

10



Public Comments to Draft GL

- **GDC 17 COMMENTS FROM INDUSTRY:**
 - ◆ FORMAL AGREEMENTS BETWEEN THE NPP AND THE TSO ARE NOT ESSENTIAL;
 - ◆ USE OF THE RTCA IS NOT ESSENTIAL;
 - ◆ GDC-17 IS A DESIGN REQUIREMENT AND DOES NOT STIPULATE OPERATING REQUIREMENTS;
 - ◆ PLANTS SHOULD NOT HAVE TO ADDRESS DESIGN CRITERIA TO WHICH THEY ARE NOT LICENSED; AND
 - ◆ OFFSITE POWER OPERABILITY DETERMINATIONS SHOULD NOT BE BASED ON CONTINGENCIES OR MODELS (i.e., HYPOTHETICAL SITUATIONS).

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

11



Response to Public Comments

- STAFF SEEKS TO UNDERSTAND HOW LICENSEES ENSURE CONSISTENT COMPLIANCE WITH REQUIREMENTS GIVEN DYNAMIC CHANGES OCCURRING IN ELECTRIC POWER INDUSTRY
- GDC-17 IMPLIES OPERATIONAL REQUIREMENTS WHICH ARE THEN REFLECTED IN TECHNICAL SPECIFICATIONS
- ALL NPPs HAVE OFFSITE POWER REQUIREMENTS SIMILAR TO GDC-17 (E.G., ATOMIC ENERGY COMMISSION CRITERION 39)
- AS DEMONSTRATED BY THE 1999 CALLAWAY EVENT, THE CAPABILITY AND CAPACITY OF THE OFFSITE POWER SYSTEM CAN ONLY BE DEMONSTRATED USING ANTICIPATED GRID AND PLANT CONDITIONS

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

12



Staff Changes to Draft GL

- IN RESPONSE TO PUBLIC COMMENTS, CLARIFICATIONS WERE MADE TO THE GL TEXT REGARDING:
 - ◆ Formal protocols with TSOs
 - ◆ Use of RTCAs
 - ◆ Use of seasonal variations in grid reliability evaluations under 10 CFR 50.65

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

13



Staff Changes to Draft GL (cont'd)

- WE ADDED THE TERM, "GRID-RISK-SENSITIVE," TO REFER TO THOSE MAINTENANCE ACTIVITIES WHICH MUST BE ASSESSED AND MANAGED FOR RISK:
 - ◆ Have a high likelihood of causing a plant trip
 - ◆ Have a high likelihood of causing a LOOP
 - ◆ Impact the ability to cope with LOOP or SBO (e.g., taking an Emergency Diesel Generator, steam-driven Auxiliary Feedwater Pump out of service)

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

14



Staff Changes to Draft GL (cont'd)

- IN RESPONSE TO THE SRM DATED MAY 19, 2005, (MO50426), AND A TI 2515/163 FINDING, WE MODIFIED TEXT FOR QUESTIONS 1, 3, 4, 6 AND 7 TO INCLUDE TRAINING:
 - ◆ SRM M050426 requested that the staff review training and examination programs in this area
 - ◆ Finding 05000286/20050302: “Inadequate corrective actions associated with training, procedural adequacy and operator knowledge on methods to address degraded grid”

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

15



Draft Final Generic Letter 2005-xx, “Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power”

Presentation to ACRS

William Raughley

Office of Nuclear Regulatory Research



RES Supporting Actions

■ SUMMARY

- ◆ Now collaborating with NERC under Memorandum of Agreement to include NPP electrical parameters in NERC grid models used for power-flow and dynamic analyses.
- ◆ The FERC also plans to participate in the use of these models.

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

17



RES Supporting Actions (Cont'd)

- ### ■ PURPOSE – Obtain a model to assess the interface between NPPs and TSOs to:
- ◆ Avoid large scale system disturbances or LOOP to NPPs
 - ◆ Identify potential for small disturbances or inadequacies to NPPs which can lead to larger disturbances or operating problems
 - ◆ Transmission system engineers and operators are made more aware of NPP constraints and critical points that need to be monitored to effectively control NPP voltage

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

18



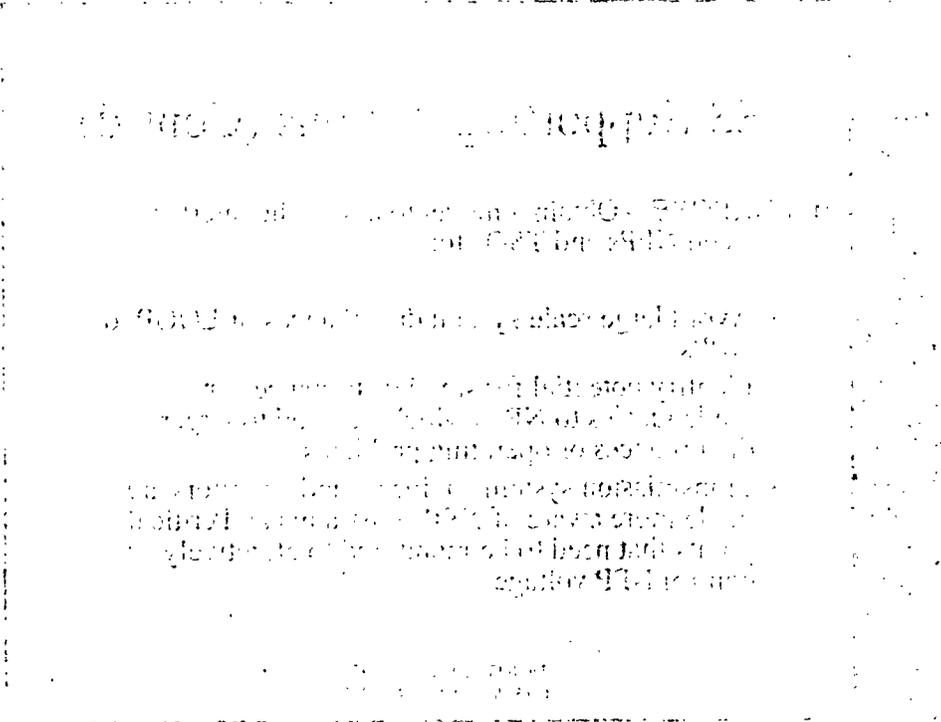
RES Supporting Actions (Cont'd)

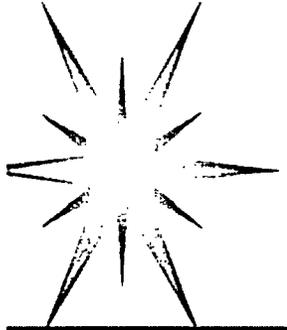
■ Uses

- ◆ A way to study grid problems
- ◆ Platform to investigate effects of grid operations on NPPs
- ◆ Keep NERC, FERC and other stakeholders informed of changes due to grid operations.

Draft Generic Letter 2005-xx
ACRS Presentation Nov. 3, 2005

19

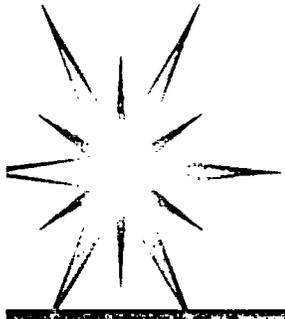




ESBWR Design Certification

Amy Cubbage, Senior Project Manager
New Reactor Licensing Branch, NRR

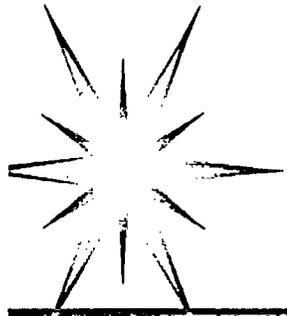
Advisory Committee on Reactor Safeguards
November 3, 2005



Previous ACRS Meetings

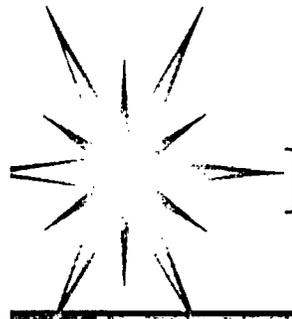
TRACG LOCA Review:

- July 2003 - Thermal hydraulic Subcommittee
- January 2004 - Thermal hydraulic Subcommittee
- February 2004 - Full Committee
- February 2004 - ACRS letter



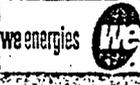
Design Certification Project Overview

- Acceptance Review
- Requests for Additional Information
- Safety Evaluation Report with Open Items
- Supplemental Safety Evaluation Report(s)
- Final Design Approval
- Design Certification Rulemaking
- Nominal Duration 42 – 60 months



ESBWR Design Certification Status

- August 24, 2004 - Design Certification Application submitted
- September 23, 2005 – Acceptance review letter sent to GE
- GE has responded to acceptance review issues (several submittals)
- Staff performing acceptance review on supplemental information
- Results to be communicated to GE by the end of November

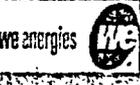


Point Beach Nuclear Plant

License Renewal Presentation to ACRS

Jim Knorr
PBNP License Renewal Project Manager
Nuclear Management Company, LLC
November 3, 2005

1



Participants

- John Thorgersen – Programs Lead
- Todd Mielke – Mechanical Lead
- Mark Ortmyer – Civil/Structural Lead
- Steven Schellin – Electrical Lead
- Brad Fromm – TLAAs & Major Components
- Bill Herrman – Programs & Implementation

2



Description of Point Beach Nuclear Plant

- PBNP Owner – We Energies
- PBNP Operator – Nuclear Management Company, LLC
- Located in Two Creeks, Wisconsin
- Architect/Engineer – Bechtel Corp.
- Westinghouse 2-loop PWRs
- Rated Thermal Power
Units 1 and 2: 1540 MWt
- Rated Electrical Output
Unit 1: 538 MWe
Unit 2: 538 MWe

3



Point Beach Features

- Four Emergency Diesel Generators
- 25 MWe Combustion Turbine
- Ultimate Heat Sink - Lake Michigan
- Once-through Cooling
- Containment - Post Tensioned Steel Reinforced Concrete with Steel Liner
- 18 Month Fuel Cycles

4



NMC

PBNP Performance Summary



we energies

Point Beach Unit 1

	Cycle 25 6/98-10/99	Cycle 26 12/99-4/01	Cycle 27 5/01-9/02	Cycle 28 10/02-4/04
Capacity Factor	93.2%	94.7%	95.3%	96.9%
Outage Duration	54 days	37 days	32 days	65 days

Point Beach Unit 2

	Cycle 24 2/99-10/00	Cycle 25 12/00-4/02	Cycle 26 5/02-10/03	Cycle 27 11/03-4/05
Capacity Factor	97.6%	96.2%	97.1%	96.7%
Outage Duration	62 days	30 days	45 days	98 days

5



NMC

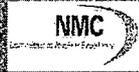
PBNP Major Improvements



we energies

- New Steam Generators
 - Unit 1 - 1984
 - Unit 2 - 1997
- Split Pin Replacement - Both Units
- Unit 2 Baffle Bolt Replacement - 1998
- New Integral-Hub Low Pressure Turbines Units 1 and 2 - 1998

6



NMC



weenergies



PBNP Major Improvements

- Upgrade Portions of Service Water System – 1998-2000
- New Containment Fan Cooler HXs Units 1 and 2 – 2000-2002
- Reactor Vessel Head Replacement
 - Unit 2 in Spring 2005
 - Unit 1 in Fall 2005
- Scheduled to Replace Auxiliary Feedwater Pumps – 2006-2007

7



NMC



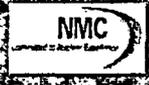
weenergies

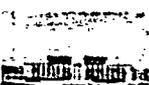


License Renewal Application

- Original License Expiration
 - Unit 1 – October 5, 2011
 - Unit 2 – March 8, 2013
- Application Submitted February 25, 2004
- LRA Process
 - Standard LRA Format with Expanded Content
 - Used Past Precedence
 - NRC Used the New Review Process with Consistent with GALL audits.

8





Corrective Action Program

- Common Process Across NMC Fleet
 - Team-Track/Passport System
 - Corrective Action Program (CAP)
- Integrated into Work Control Process.
- Establishes measures to be taken to assure correction of conditions adverse to quality.
- Thus providing reasonable assurance that:
 - The cause has been determined
 - Corrective actions preclude repetition
 - Corrective action is taken in a timely, effective and sustainable manner
- Integral to Tracking Commitments.

9





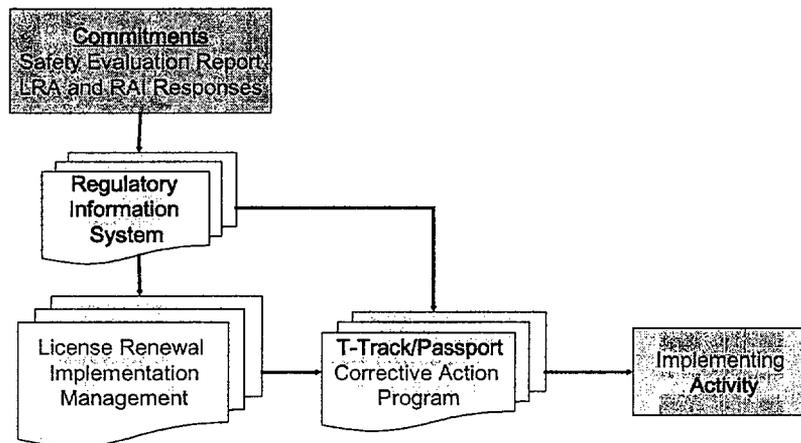
License Renewal Commitments

- Commitments were provided as part of the original LRA and modified as part of review.
 - 72 Commitments listed in SER
 - 7 are already complete
- Each of these commitments is managed by our Regulatory Information System and tracked to completion using the Corrective Action Program.
- New Chapter 15 of the FSAR will contain the programmatic and TLAA related license renewal information.
- Existing FSAR sections will be revised to include the appropriate changes resulting from the LRA review.

10

Commitment Management

Commitments were documented in the License Renewal Application or added and modified as needed during the NRC review



NMC

License Renewal Implementation

- License Renewal Implementation has begun.
 - An Aging Management Program owner has been appointed for each AMP.
 - Procedures are being marked up to identify changes required for License Renewal.
 - Some One-time inspections have already been completed.
 - Capitol budget has been provided through 2006 for a focused implementation effort.





NMC

License Renewal Implementation



we energies



- License Renewal Implementation continues.
 - Organizational changes have been identified to ensure aging management processes are sustainable.
 - Commitments will be completed prior to the period of extended operation or sooner.
 - Individual tasks for each commitment not completed by the end of 2006 will be entered into the Corrective Action Program to ensure completion.
 - Currently Implementation is 20% complete.



13

Point Beach Nuclear Plant, Units 1 and 2 License Renewal

Safety Evaluation Report

Staff Presentation to the ACRS Full Committee
Verónica Rodríguez, Project Manager
Patricia Lougheed, Team Leader, Region III
Office of Nuclear Reactor Regulation
November 3, 2005

Review Highlights



- 2-Unit PWR
- East Central Wisconsin
- West shore of Lake Michigan
- Operating License Expiration Dates:
 - Unit 1: October 5, 2010
 - Unit 2: March 8, 2013
- License extension request:
 - February 25, 2004

Review Highlights



NRC Audits and Inspections

AMP GALL Audit

– April 26-30, 2004

Scoping and Screening Methodology Audit

– June 21-25, 2004

AMR GALL Audit

– June 7-11, 2004

Regional Scoping and Screening/AMP Inspection

– March 7-25, 2005

Regional LR Followup Inspection

– August 15-19, 2005

SER - Overview



• SER with Open Items issued on May 2, 2005

– Five (5) Open Items

- 2 Aging Management Programs (AMPs)

- 3 Aging Management Reviews (AMRs)

– Fifteen (15) Confirmatory Items

– Three (3) License Conditions

• SER issued on October 1, 2005

– All Open Items and Confirmatory Items closed

– One (1) License Condition modified to incorporate applicant's PTS commitments

SER - Open Items



⊙ B2.1: ASME Section XI ISI Programs

= Applicant provided technical justification for the exceptions. Most of the exceptions did not affect aging management and were withdrawn.

⊙ B2.1.4-2: Bolting Integrity Program

= Applicant provided specific exceptions and its technical justifications. Committed to perform random hardness testing.

⊙ 3.5-4: PWR Containment

= Applicant committed to include evaluation, repair and replacement requirements in the ISI AMP.

SER - Open Items



⊙ 3.1.1-3: Steam Generators AMR

= Components in contact with primary water made of corrosion-resistance material. No industry or plant operating experience showing loss of material. Staff revisited guidance, applicant's justification found acceptable and consistent with the updated GALL.

⊙ 3.3-7: Component Cooling Water System AMR

= Applicant committed to use the One-Time Inspection Program in conjunction with the Water Chemistry Control Program.

SER - Confirmatory Items



CI 2.1-1: Scoping Criteria

Revised Methodology (letter dated April 29, 2005)

- Removed "Exposure Duration" term
- New methodology using "Spaces" approach
- Scope expansion
 - No new aging effects mechanisms identified
 - New Tables and Line Items in Sections 2 and 3
 - 14 New Component Types

New methodology and scope expansion reviewed by NRR and Region III staff and found acceptable. No omissions were identified.

ACRS Interim Report Letter Highlights



ACRS Interim Report letter - June 9, 2005

EDO and staff response - July 15, 2005

- NRC Actions under License Renewal
 - 10 CFR 54.30
 - AMP/AMRs audited and inspected
 - Routine followup inspection - August 15, 2005
 - Post-approval license renewal inspection
- NRC Actions under ROP
 - Performance assessed quarterly
 - Recent CAL inspections, including PI&R
 - Additional PI&Rs currently scheduled for CY07 and 09
 - Once findings are closed, 200 hrs of direct inspection

ACRS Interim Report Letter

RIII Followup Inspection



- Three Areas Identified as Needing Followup Inspection
 - One-Time Inspection Program
 - Scope Expansion (new scoping methodology)
 - CAP, specifically License Renewal Commitments
- Items inspected in August 2005
 - Documented in Inspection Report 2005-015
 - All areas found acceptable
 - All Open Items closed

ACRS Interim Report Letter

Reactor Oversight Process



- Current operation acceptable
- NRC continues to monitor performance
- Licensee remains in Column IV of the ROP Action Matrix
- Confirmatory Action Letter (CAL) remains in effect
- Special inspections performed over the summer to assess CAL areas of concern

ACRS Interim Report Letter

Reactor Oversight Process



• Two areas returned to baseline inspection program; three areas under assessment:

- **Emergency Preparedness**
inspected in June and July 2005
- **Engineering and Operations Interface**
inspected in July and August 2005

No findings greater than Green identified.
Sufficient improvement to warrant return to baseline inspection.

ACRS Interim Report Letter

Reactor Oversight Process



Human Performance

inspected in June 2005

Engineering Design Control

inspected in July and August 2005

Problem Identification and Resolution

inspected in September and October 2005

NRC continues to assess all three areas.

Areas remain adequate for continued operation.

Conclusion



The staff has concluded that there is reasonable assurance that the activities authorized by the renewed licenses will continue to be conducted in accordance with the CLB, and that any changes made to the CLB in order to comply with 10 CFR 54.29(a) are in accord with the Act and NRC regulations.

Point Beach Nuclear Plant, Units 1 and 2 License Renewal Safety Evaluation Report

Staff Presentation to the ACRS Full Committee
Verónica Rodríguez, Project Manager
Patricia Loughheed, Team Leader, Region III
Office of Nuclear Reactor Regulation
November 3, 2005